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THE MENDELIAN THEORY OF HEREDITY.

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[The principles of Mendelism are gradually emerging from the domain of theory, and are being proved by investigators in the field of agricultural science to be capable of practical application in the evolution of new types of economic plants, while in some instances the accuracy of the theory has been proved with several races of domesticated animals, principally in regard to conspicuous characteristics. As yet the possibility of this great discovery proving a reliable guide to the breeder of farm stock has to be demonstrated; but the scientist has given the assurance that Mendelism will ultimately prove as valuable an aid to the practical farmer as it has been to the plant-breeder. The Mendelian law, as enunciated in the text-books on the subject, is somewhat difficult for the ordinary reader to grasp, and endeavour is here made to translate the theory into the simplest possible form, so that readers of this *Journal* may gain a clear idea of it, and thereby understand the difficulty presented in applying it to all classes of animals and plants.—ED.]

THE system of heredity known as Mendelism was first investigated by Gregor Mendel about half a century ago. Mendel's work was overlooked for thirty-five years, but its rediscovery by de Vries and others opened up what is undoubtedly a new era in the scientific study of heredity.

The purposes of this paper are—

(1.) To explain as simply as possible the fundamental principles of the theory.

(2.) To describe a few cases of Mendelian inheritance.

(3.) To indicate briefly how breeders of plants and of animals may benefit from a knowledge of the Mendelian discovery.

To understand most of the books and pamphlets on Mendelism requires a greater degree of biological knowledge than is commonly possessed by ordinary readers. Without sacrificing scientific correctness, this paper attempts to present the subject as free as possible of technicalities.

Among the higher plants and animals reproduction takes place by the union of two sex-cells. Speaking of these reproductive cells without respect to the sex of the individual from which they arise, we call them "gametes." One of the first results of the union of two gametes is the formation of what is called a "zygote." Strictly speaking, the term "zygote" should be applied only to the fertilized ovum; but it will be convenient for our purpose to apply the same term to the individual, whether plant or animal, which arises from the further development of the fertilized ovum. Two important deductions follow from this fundamental fact of sexual reproduction:—

(1.) In the first place, as the gametes are the link between any given generation and the next succeeding generation, it follows that the gametes are the carriers of heredity.

(2.) In the second place, it is important to remember that the zygote, whether plant or animal, is a *double* structure, because it is the result of the union of two gametes. Not only is it double in respect of what it inherits, but also in respect of what it is able to transmit. This idea must be clearly realized before it is possible to understand the principles of Mendelian inheritance.

Mendel's experiments were conducted on several kinds of plants, but chiefly on varieties of the edible pea. His method of investigation may be tabulated as follows:—

1. He chose two varieties of peas, differing as widely as possible in some well-marked character. These two varieties he cross-fertilized.

2. He sowed the seeds thus obtained, which, it will be noted, are the zygotes formed by the union of pairs of gametes from the original parents (using the term "zygote" in the meaning already explained).

3. The plants arising from these seeds were examined and their characters recorded. These plants are called the "first filial generation," or, briefly, F_1. It must be noted that the F_1 includes the above-mentioned seeds as well as the plants into which they develop.

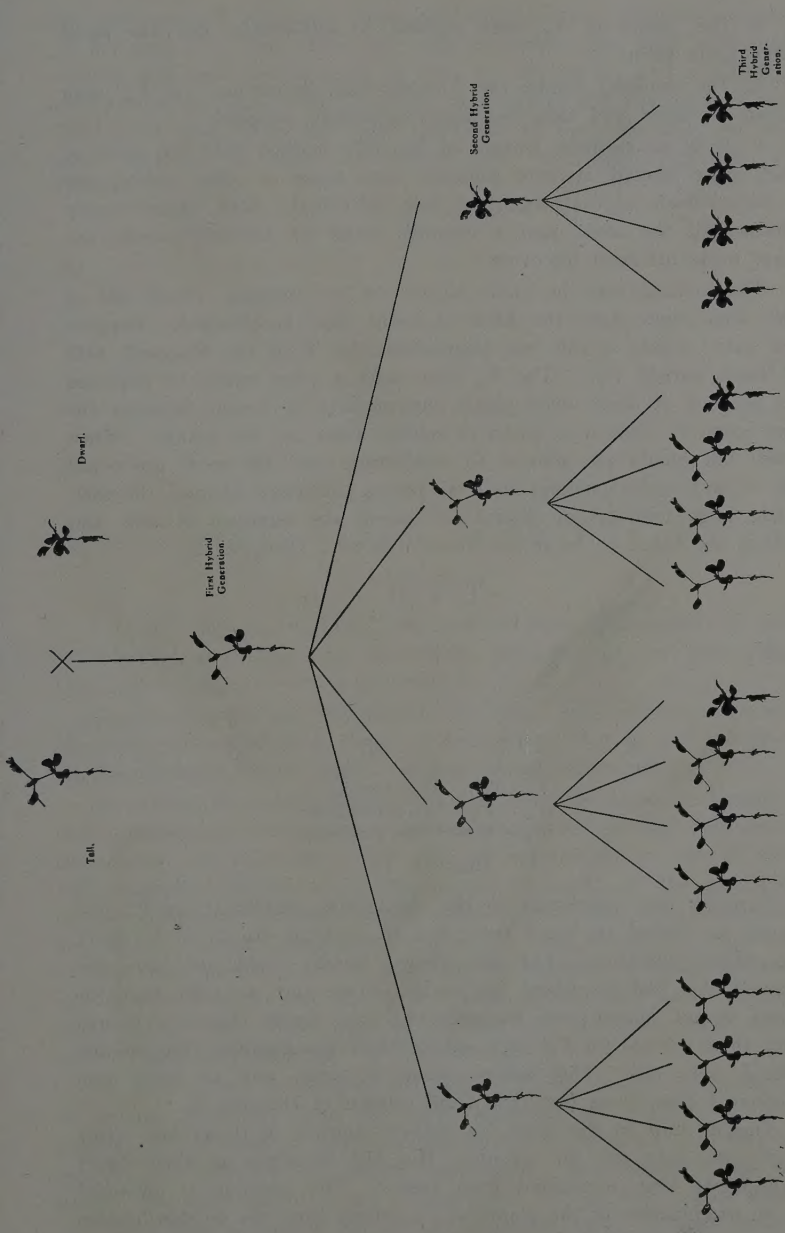


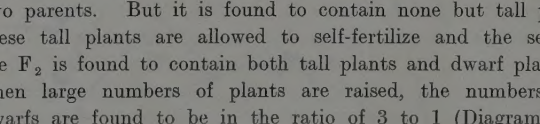
DIAGRAM TO ILLUSTRATE THE MENDELIAN INHERITANCE OF TALLNESS AND DWARFNESS IN THE CULINARY PEA.—FROM DARBISHIRE'S "BREEDING AND THE MENDELIAN DISCOVERY."

4. The plants of F_1 were allowed to *self-fertilize*, and the seeds were again sown.

5. The resulting plants, the "second filial generation," or F_2, were again examined and their characters separately recorded.

6. It is an essential feature of Mendel's method that the seeds of each plant should be kept separate from those of other plants, and a record made of the progeny of each individual. Had Mendel simply thrown all the seeds into a common stock he probably would not have made his great discovery.

The method may be made clearer by an example, which will at the same time show the kind of result that is obtained. Suppose we have crossed a tall pea (represented by T in the diagram) with a dwarf variety (D). The F_1 from such a cross might be expected to produce at least *some* plants intermediate in height between the two parents. But it is found to contain none but tall plants. When these tall plants are allowed to self-fertilize and the seeds are sown, the F_2 is found to contain both tall plants and dwarf plants. Further, when large numbers of plants are raised, the numbers of talls and dwarfs are found to be in the ratio of 3 to 1 (Diagram 1).



T = Tall. D = Dwarf.
F_1 = First filial generation.
F_2 = Second filial generation.

DIAGRAM 1.

Carrying the experiment to the third filial generation, or F_3, the dwarfs are found to breed true, and to continue to do so in every succeeding generation. (As said above, Mendel could not have discovered this had he mixed his seed.) From this we infer that the dwarf plants inherit and transmit only the dwarf character though both their parents (in F_1) and one of their grandparents (the original plants) were tall. The tallness seems in some way to have been eliminated from them (see right-hand column of Diagram 2).

Turning now to the three (or, rather, multiple of three) tall plants of F_2, we may ask the question, Has the dwarfness of their dwarf grandparent been eliminated from them? The question is answered by an examination of the plants of F_3, arising from the self-fertilization of these tall plants of F_2. We find that one out of every three tall plants breeds true to tallness, and may therefore be assumed to have

its grandparents' dwarfness eliminated from it (see left-hand column of Diagram 2). The other two talls, however, give both talls and dwarfs, and again in the ratio of 3 to 1. In the F_4 and succeeding generations the same thing happens: the dwarfs and one-third of the talls breed true, while the other two-thirds of the talls carry on the same sequence of talls and dwarfs (see two middle columns of Diagram 2).

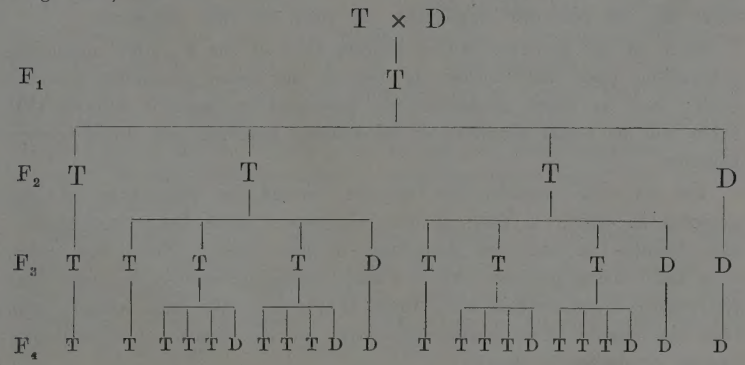


DIAGRAM 2.

Turning again to Diagram 1 we now see that the members of the second filial generation (F_2) appear in the ratio of one pure tall, two impure talls, and one pure dwarf (1 : 2 : 1).

Mendel repeated his experiments on peas with respect to other characters—colour of seed, shape of seed, shape of pod, and so on—always obtaining results similar to those already described.

To explain these facts Mendel assumed that the physical character of an organism is the sum of a number of components, and that these components are separable. This idea of separability is one of the most important in the whole theory, and is known as the principle of *unit characters*. Mendel further assumed that these unit characters are produced in pairs, each member of a pair being exactly the opposite of the other member, as (to keep to the example of peas) tallness and dwarfness, green seed and yellow seed, smooth seed and wrinkled seed, and so on. These pairs of opposed unit characters have been called "allelomorphic pairs" or "allelomorphs."

We have already referred to the gametes as the bearers of heredity. It follows, therefore, that the unit characters are carried by the gametes. This leads to the essential feature of Mendel's discovery—namely, the principle of *gametic segregation*. He assumed that a gamete can carry *one* of a pair of characters, *but not both*. This does not mean that a gamete carries one character only; it may carry scores or hundreds, but each of these will be one of a pair; its

opposite will be carried by some other gamete. The characters are said to segregate, or separate, each from its opposite, in the gametes.

Thus in our example the gametes of the dwarf of F_2 and the succeeding generations carry the *dwarf character only*—they are pure for that character. Hence the zygotes arising from their union inherit dwarfness only and are able to transmit dwarfness only. Similarly, the gametes of the pure talls of the F_2 and succeeding generations carry the *tall character only*—they are pure for that character.

Each of the gametes of the impure talls of the F_2 and succeeding generations may carry either the tall or the dwarf character, but not both; and as these characters are produced in pairs it follows that there will be equal numbers of tall-bearing gametes and dwarf-bearing gametes.

Let us now consider the zygotes formed by the union of two gametes in which a pair of unit characters have been segregated—say, tallness in one and dwarfness in the other. From the union of a tall-bearing gamete with a dwarf-bearing gamete it is clear that the zygote must contain both these characters. We have already seen that the zygote is a double structure, so we denote this particular zygote symbolically thus—

(T . D),

where T stands for tallness, D for dwarfness. When we know the antecedents of any individual with respect to a pair of unit characters we can express its constitution in this way; and unless we can write it thus we cannot foretell what will be the nature of its offspring with respect to that pair of unit characters, when allowed to self-fertilize (in plants) or to breed with a similar individual (in plants or animals).

Such an individual—(T . D)—is able, through its gametes, to transmit both characters, some gametes carrying tallness and some carrying dwarfness, but no gamete carrying both characters. If a large number of such individuals of opposite sex produce gametes and these gametes are allowed to unite without outside interference, we shall have new zygotes in which the two characters are combined at random. Suppose we have such a case as this:—

♂ (T) . (T) . (D) . (D),

that is, four male* gametes, two of each kind;

♀ (T) . (T) . (D) . (D),

that is, four female* gametes, two of each kind. It is clear that sixteen (4 × 4) unions are possible, for any one of the four male

* The symbols ♂ and ♀ are used to denote males and females respectively.

gametes may unite with any one of the four female gametes. The possible combinations are as follows:—

(D × D)	4 times	putting the male gamete first in each case.
(D × T)	4 „	
(T × D)	4 „	
(T × T)	4 „	

Out of these sixteen there are twelve which bear the character of tallness (T) and only four which bear the character of dwarfness *only* (D)—that is a ratio of 12 to 4. This explains the ratio of 3 to 1 in the F_2 of our previous examples, for it appears that whenever the character of tallness is in the zygote it is manifest in the outward visible form of the individual, even though the dwarf character is also present: whereas the character of dwarfness is manifest only in the *absence* of tallness.

Mendel found that a similar result follows in the case of other pairs of unit characters. He was therefore led to enunciate the Law of Dominance: that character which is always manifest when present he called "dominant"; that which is manifest only in the absence of its opposite he called "recessive."

(To be continued.)

That the agricultural colleges and experiment stations and the Department of Agriculture have had a large share in bringing about improved conditions goes without saying. The investigations of these institutions have put farming on a better paying and more permanent basis, and, thanks to their teachings, it is no longer customary for the intelligent farmer to yield ground to the grasshopper, the army-worm, the brown-rot, and other pests of his fields and flocks. Instead, he fights these invaders with the weapons that science has put into his hands, and for his pains secures better crops and higher prices than his careless or ignorant neighbours.—*U.S. Experiment Station Record.*

PURE SEED should be the farmer's first consideration. Impure and cheap seed is the worst investment a farmer can make. It too often spells failure, poisons the soil, and brings about rapid deterioration of the farm and its owner.

LUCERNE.

H. T. TURNER.

THERE has been a diversity of opinion as to where this plant first came from. It is many centuries old, and history does not give a record; but agricultural literature, even of the old Roman days, contains descriptions of the methods of cultivating the plant and urges its more extensive use. It has been grown in different parts of the world with varied success, acting strangely under cultivation, growing beautifully for one and refusing to respond to another. It seems strange, now that its cultivation is being taken up around us, why it has been so long neglected as a forage-plant. But, thanks to the Director of Experimental Farms, who has taken a very great interest in the matter, trials are being carried out in many parts of the country, especially in those parts where lucerne has hardly been heard of.

It was held for a long time that lucerne-growing must be confined to certain regions. Now it is known that it thrives, so far as climate is concerned, in many parts of the world. Certainly it yields greater crops in warm climates, where it has a longer growing season than in a cold one.

It was thought that only certain soils would grow lucerne, but it has been found that it will flourish on most soils, as long as they are not too wet. Of course, it prefers rich loose open soils, where it will grow luxuriantly.

As one writer says, "It is easily the queen of all forage-plants, and of all the plants of the meadow it is the premier." It is the hardiest of them all, the most lasting, the most productive, the most efficient soil-enricher, and it yields hay of the highest quality.

It grows splendidly in dry land made sweet with lime (where this is necessary) and rich with manures. But it must find fertile soil on which to begin; it cannot thrive on worn-out land. I have seen it grow splendidly on sandy soil only a few chains from the high-water mark of the ocean.

Lucerne is a perennial, growing on suitable soil from five to fifty years with one sowing. I know of one patch that has been growing for over twenty years, and during that time it had been very much neglected, except when it came round to the time of the year for it to be closed up for hay. It has produced three to five cuts of hay all these years, and yet has not received one pound's worth of manure.

As a feed for all classes of stock it cannot be equalled. The only difficulty when grazing sheep or cattle on lucerne is that, being a leguminous plant, it sometimes causes hoven in stock. However, if it is mixed with other grasses in the pasture, the animals consume them together and undergo very little risk of this trouble. Lucerne provides the highest return if it is cut and carted to stock. It resents continuous cropping by animals. They should not be put on the lucerne until the plants have grown nearly to the flowering stage, and it should not be grazed closely, and on no account should sheep or cattle be pastured upon it immediately after it has been mown, as this is the surest way of destroying the plant. After it is mown it is not safe to depasture it until the plants have reached a strong vigorous stage of growth. Stock should not be allowed to graze on the land when it is wet.

There has been a great difference of opinion as to the right time for cutting lucerne, but I consider that it is best to cut it when about one-fifth of the plants begin to show bloom. Another way is to watch for the buds at the base of the plants and cut when they appear above the ground. These buds are the beginning of new stalks, and their appearance indicates that the plant is ready to make another crop.

There are four things that make for success in lucerne-growing: these are lime, drainage, humus, and inoculation. Lime is necessary for soils not naturally containing much of it. Then, as to drainage, there is very little use planting lucerne on any soil where the permanent water-line is at a depth of less than 3 ft. Lucerne may grow successfully until the roots reach this level, then it will probably die. Fertile soil contains enough humus. Stable manure, when obtainable, is the very thing for adding the proper humus to the soil. With regard to inoculation the following should be known: All legume plants have bacteria that work on their roots, forming nodules. These bacteria obtain nitrogen from the atmosphere and both supply the plants with it and add it directly to the soil. Inoculation may be done in a very inexpensive way by obtaining soil from a lucerne paddock that has been established a few years. The Department of Agriculture has been supplying such inoculated soil in small lots for experimental plots, and there is no doubt that it is proving successful.

The plants may be harrowed, if necessary, when from 5 in. to 6 in. high; and when 8 in. to 10 in. high, if weeds are present or if the tops of the plants should lose colour, the mower should be run over the ground, set so high as not to cut the crowns of the plants. What is thus mown should be left on the land to mulch.

The preparation of the soil should begin a year before the seed is sown. The object sought is, firstly to clean the land, and secondly to

conserve the moisture as far as this is possible. These objects may be secured by careful summer fallowing of the land, or by growing a clean, cultivated crop.

The seed should be sown with a drill, and it should not be buried deeply—not more than 1 in. When thus sown it comes up evenly. Where sown broadcast it is not buried evenly, and if dry weather follows the stand will be uneven. If the drill will not sow the seed alone, it may be mixed with something, as dry soil, free from grit. Only the best seed procurable should be sown, and the quantity should be from 15 lb. to 20 lb. per acre.

GRASSES AT RUAKURA.

A. W. GREEN.

THE grass-plots at Ruakura Farm of Instruction have been revised. Some varieties were transplanted on to new ground, while others, of a more permanent nature, were worked between and hand-weeded, in order to destroy all foreign plants present through the varieties seeding.

Grasses which made most growth during winter include *Bromus unioloides*, *Bromus carinatus*, *Bromus giganteus*, *Bromus pumpillaria*, *Alopecurus pubescens*, Wakeman's fescue, and *Avena flavescens*. There is no doubt that for winter feed the prairie-grasses stand out prominently. By cutting them frequently quicker growth is encouraged. Amongst new grasses, teff proved useless for winter, being cut off by frost. Bittle-grass also affords little feed from May to the beginning of August; but the plants rooted strongly, and now show signs of giving early spring feed.

Wakeman's fescue continued growing right through the winter, and is at the present time greener than any other grass. Grass-grub does not appear to destroy the fibrous roots of this grass, and so far it is unaffected, being in this respect like the various species of paspalum. It closely resembles Chilian fescue (*Festuca dumetorum*) both in habit and rate of growth. Neither of them seeds freely, which is another correlated character. Both spread rapidly under the soil. Plants raised from the first sowing were divided, and a portion of these sent with other grasses to the South Island. From the last sample received and sown on the 27th March, 1912, several hundred plants have been raised. They made good growth for this time of the year.

Hairy foxtail (*Alopecurus pubescens*) is already in flower, being the first variety of grass to flower this season. Unaffected by frost, it continued growing throughout the winter. Its value for winter feed over the ordinary meadow-foxtail is quite marked.

BASIC SLAG.

SUCCESSFULLY EMPLOYED AS AN INSECTICIDE.

Basic slag, that one-time residual waste of the steel blast furnace—the dross formed in the removal of phosphorus from iron-ore—is not only proving a fertilizer of great value in this country, as well as an excellent corrective of acidity in the soil, but it is well known that root crops manured with slag are not affected with certain diseases which are often present when other manures are used.

Now, according to an investigation in France, basic slag is proving of distinct value in the destruction of the plant-louse. In Europe this insect has been very destructive, especially to sugar-beet. All mixtures or liquors used for spraying plants as a protection against these insects have been applied in vain. The "false brown rust" or "curl" of the peach is caused by the plant-lice, and it cannot be successfully fought because neither liquors nor powders can be made to reach the little animals. When the beet-plant is attacked the leaf curls up and protects the insect against any treatment the farmer may apply.

It has been found that by the application of large quantities of nitrates after rains the beet is stimulated to push out new leaves, which take the place of those destroyed by the plant-lice. But this method has its dangers, since an excess of nitrogen in the soil may be just as harmful to the plants as the action of the insects.

J. P. Wagner, a sugar-beet expert, recently told the National Society of Agriculture of France of a successful attempt to fight these insects by means of basic slag. He spread about 1,400 lb. of the basic slag to the acre on fields that were infested with the plant-louse. Not only did this treatment prevent the insects from attacking the leaves, but they were driven away from leaves they had already attacked. On another field the slag was applied in larger quantities. Every plant was already attacked by the insects when the dross was applied. Within eight days all the insects had disappeared, and the plants recovered their healthy appearance and colour.

The method by which the basic slag operated in these cases is not known. Wagner thinks that the compound forms a thin layer on the leaf, spreading out over the whole surface, and that it is either distasteful or injurious to the insect. It is well known that many lime compounds are injurious to animals with soft, naked skins, such as snails, caterpillars, naked larvæ; but it has not been shown that a similar effect is actually produced in the treatment against plant-lice with basic slag.

NEW ZEALAND WOOL.

EXHIBITION OF LINCOLN FLEECE IN ENGLAND.

IN order to afford English farmers an opportunity of comparing the Lincoln wool produced in this country with that grown in the Homeland, the Live-stock and Meat Division of the Department sent, through the High Commissioner in London, a fleece of specially selected Lincoln ewe hogget fleece wool, fourteen months' growth, from Mr. William Perry, of Penrose, Masterton, for exhibition alongside English wool at the Royal Show of England. It was considered that this fleece was equal, if not superior, to anything of its class grown in England, and that it would prove a valuable advertisement for the wool-growing industry of the Dominion.

The fleece was shipped in February last to the High Commissioner, with a request that a suitable card be prepared for the exhibit, and that at the conclusion of the Royal Show the fleece be placed on exhibition in his office, and further exhibited at any other place he might consider desirable.

Under date of 5th July, the High Commissioner reported that, after much correspondence, the Royal Show authorities declined to allow the fleece to be exhibited in the section devoted to English wool classes, the Society replying that "they much regret they cannot see their way to accept your kind offer for exhibition of a fleece of Lincoln wool in the show-yard at Doncaster." Fortunately, however, the High Commissioner was able to secure the exhibition of the fleece in the Court of the Victorian section of the Commonwealth of Australia's display at the Show, through the courtesy of Sir John Taverner, Agent-General for that State. A card was displayed with the exhibit, lettered as follows:—

NEW ZEALAND WOOL.

LINCOLN EWE HOGGET FLEECE.

Grown by W. Perry, Esq., Penrose, Masterton.

Exhibited by the N.Z. Government,
Department of Agriculture.

While it was satisfactory to get the fleece exhibited at all, the valuable advertisement intended was, of course, not secured.

ANALYSIS OF SOILS.

B. C. ASTON, F.I.C., F.C.S.

THE tables appended give the results of the soil-analyses made for the Department during the last year. It should be understood that these soils, with the exception of those taken by the officers in charge of the experimental plots, are collected and sent in for analysis by farmers, and have only been analysed because it was thought that some unusual features might be disclosed, and new methods of treatment thereby suggested. Advice on manuring and on treatment of soils generally may usually be given without an analysis being performed, especially if the type of country and soil is well known. Farmers will therefore kindly note that the first step to have an analysis of their soils made is to fill in form Ag. G/5 (which can be obtained at the office of any district agent of the Department), as fully as possible. Should it then seem that the expense of an analysis would be justified by the possible information secured, a second form will be sent, showing how to collect the samples. This is the procedure recommended in isolated cases. A more reasonable and effective way of proceeding is for the farmers of a district to co-operate and apply for assistance in having the area they are interested in made the subject of laboratory and field experiments by the officers of the Department engaged in that kind of work. In fact, something in the nature of a soil-survey is essential if the greatest good to the greatest number is to result from the soil-work of the Department.

I have much pleasure in acknowledging the enthusiastic help rendered me by my assistants, Messrs. F. T. Leighton, Theodore Rigg, M.Sc., and Lawrence Foster, in this work.

The tables referred to appear on the following pages.

The Annual Show of the Ashburton Agricultural and Pastoral Association will be held on the 30th and 31st October.

In Finland there are ten associations of agriculturists for the promotion of the production of seeds of forage plants. These are united in a central organization, which every year holds a seed competition, at which all the members must exhibit their products.

ANALYSES OF SOILS.

CHEMICAL ANALYSES.

Laboratory No.	Locality.	Volatile Matter.		Total Nitrogen.	Citric-acid Extract in Twenty Hours (Dyer's Method—Hall's Modification).			Reaction of Soil to Litmus.	Hydrochloric-acid Extract.				Remarks.
		At 100° C.	On Ignition.		Potash (K_2O).	Phosphoric Acid (P_2O_5)	Colour of Extract on Ignition.		Lime (CaO).	Magnesia (MgO).	Potash (K_2O).	Phosphoric Acid (P_2O_5).	
B/43	Gordonton, Waikato..	26·54	58·05	0·780	0·010	0·003	Light orange ..	Strongly acid	0·20	0·07	0·05	0·07	Deficient in available phosphoric acid.
284	Waiharakeke, Waikato	11·22	23·84	0·48	0·029	0·008	Dark purple ..	Faintly acid	0·37	0·23	0·07	0·15	Well supplied with available potash; low in available phosphoric acid.
345 (2)	Cambridge, Waikato..	14·72	11·62	0·219	0·048	0·006	Dark reddish-brown	Acid ..	0·21	0·30	0·24	0·14	Very high in available potash; low in available phosphoric acid.
(3)	„ „ ..	20·92	21·62	0·356	0·018	0·016	Dark-bluish-brown	„ ..	0·21	0·20	0·23	0·23	Well supplied with available plant-food.
405	Te Moana, Canterbury	4·92	9·43	0·297	0·013	0·017	Light brown ..	„ ..	0·48	0·28	0·18	0·11	Soil from experimental plots.
409	Westport	4·70	8·53	0·196	0·011	0·004	Yellowish-white	„ ..	0·07	0·09	0·09	0·016	Deficient in available and total phosphoric acid and in lime. Organic matter low.
410	Uritane, Waimate ..	3·34	5·92	0·196	0·019	0·020	Light brown ..	„ ..	0·64	0·42	0·21	0·17	Well supplied with plant-food.
512	South Norsewood, Hawke's Bay	18·52	24·03	0·640	0·021	0·013	Bright reddish-brown	Faintly acid	0·32	0·11	0·09	0·12	Well supplied with available plant-food.
519 (1)	Cowes, Auckland ..	7·46	7·14	0·200	0·019	0·010	Yellowish-brown	Neutral ..	0·53	0·12	0·10	0·076	Deficient in available and total phosphoric acid; well supplied with available potash.
(2)	„ „ ..	7·22	8·28	0·205	0·028	0·006	Dark greyish-brown	Faintly acid	0·30	0·33	0·30	0·132	Ditto.
(3)	Cowes, Auckland (composite of 3 samples)	10·04	12·09	0·227	0·028	0·005	Brown ..	„	0·20	0·10	0·12	0·064	„
521 (1)	Mackenzie Country, Otago	2·92	5·55	0·208	0·011	0·012	„ ..	Acid ..	0·70	0·60	0·28	0·11	Soil from experimental plots.

Mechanical Analyses.

Laboratory No.	Description.	Residue on Washing.	Capillarity.	Capacity for holding Water.	Coarse Sand.	Fine Sand.	Silt.	Fine Silt.	Clay.	Moisture, &c.	Remarks.
B/43	Black clay soil	..	..	..	..	..	..	..	..	..	No mechanical analysis.
284	Light-brown fine sandy soil ..	Medium ..	Excellent	Excellent	9·0	65·9	5·6	3·8	4·6	11·1	Trace gravel.
345 (2)	Stiff light-brown sandy clay ..	Small ..	Fair ..	Fair ..	6·0	33·5	6·0	9·0	35·7	9·8	,,
(3)	Rather stiff light-grey sandy clay	Very small ..	Poor ..	Very good	1·0	40·4	4·7	7·7	32·9	13·3	
405	Fine sandy loam	,, ..	Good ..	Good ..	1·0	40·8	15·2	14·3	21·8	6·9	
409	Greyish-brown clay loam ..	Small ..	,, ..	Fair ..	3·0	34·3	22·5	16·7	16·9	6·6	
410	Light-brown fine sandy loam	Very small ..	,, ..	,, ..	1·0	36·4	17·4	14·7	22·6	7·9	
512	Dark-brown sandy loam ..	Large (23%)	Bad ..	Very good	23·0	38·5	2·3	3·5	14·5	18·2	Trace fine gravel.
519 (1)	Rather stiff light-brown sandy clay	Medium ..	Good ..	Fair ..	11·0	35·4	9·1	14·9	23·7	5·9	Gravel, 2 per cent.; fine gravel, 3 per cent.
(2)	Brown coarse sandy clay ..	Large ..	,, ..	Good ..	16·0	35·6	6·6	9·9	29·4	2·5	Fine gravel, 3 per cent.
(3)	Stiff greyish-brown coarse sandy clay	..	Poor ..	Fair ..	20·0	27·7	6·4	10·7	25·6	9·6	,, 4 per cent.
521 (1)	Loose light-grey fine sandy loam	Medium ..	Very good	Very good	10·0	50·1	13·1	9·5	14·6	2·7	,, 2 per cent.

ANALYSES OF SOILS—*continued.*

CHEMICAL ANALYSES.

Laboratory No.	Locality.	Volatile Matter.		Total Nitrogen.	Citric-acid Extract in Twenty Hours (Dyer's Method—Hall's Modification).			Reaction of Soil to Litmus.	Hydrochloric-acid Extract.				Remarks.
		At 100° C.	On Ignition.		Potash (K_2O)	Phosphoric Acid. (P_2O_5).	Colour of Extract on Ignition.		Lime (CaO).	Magnesia (MgO)	Potash (K_2O)	Phosphoric Acid (P_2O_5).	
521 (2)	Mackenzie Country, Otago	5·32	7·92	0·283	0·035	0·015	Brownish-grey	Acid ..	0·54	0·73	0·26	0·11	Soil from experimental plots.
(3)	Ditto	1·38	2·85	0·090	0·011	0·022	Grey ..	,, ..	0·65	0·60	0·18	0·07	
522	Herbert, Otago ..	10·22	10·07	0·229	0·017	0·012	Brown ..	,, ..	..	..	0·35	0·097	Low in available and total phosphoric acid.
531	Hastings, Hawke's Bay	11·86	17·49	0·522	0·026	0·011	Light orange ..	,, ..	0·68	0·18	0·12	0·166	Well supplied with available plant-food, except phosphoric acid, which is low.
566	Makuri, North Wairarapa	2·56	6·86	0·210	0·011	0·017	Light brownish-yellow	, ..	0·30	0·46	0·25	0·12	Deficient in lime.
591	Oroua Downs, Manawatu	4·16	9·28	0·280	0·010	0·016	Yellowish-brown	,, ..	0·60	0·28	0·08	0·12	Low in available potash.
592	Hunterville, Manawatu	6·80	12·83	0·380	0·026	0·025	Dark brown ..	,, ..	0·38	0·30	0·16	0·14	Well supplied with plant-food.
614	Aongatete, Bay of Plenty	9·70	17·23	0·430	0·024	0·012	Light pinkish-brown	Faintly acid	0·22	0·13	0·10	0·20	Low in available phosphoric acid.
629 (1)	Waihi, Auckland ..	6·62	13·58	0·203	0·060	0·008	Brown ..	Acid ..	0·16	0·14	0·19	0·21	Soil from experimental plots.
(2)	,, ,, ..	7·18	15·17	0·231	0·060	0·030	Dark bluish-brown	Faintly acid	0·39	0·20	0·19	0·46	
634	Ryde, Auckland ..	5·88	9·52	0·210	0·014	0·003	Light brown ..	Acid ..	0·16	0·12	0·14	0·06	Deficient in available and total phosphoric acid and in lime.
646 (1)	Hukerenui, North Auckland	7·36	11·96	0·28	0·014	0·004	Light yellowish-brown	,, ..	0·10	0·15	0·16	0·06	Deficient in available phosphoric acid and in lime.
(2)	Ditto	3·16	12·25	0·29	0·011	0·006	Yellowish-brown	,, ..	0·15	0·11	0·11	0·06	Ditto.
(3)	,, ...	5·76	13·12	0·30	0·023	0·005	Dark grey ..	,, ..	0·23	0·29	0·21	0·16	,,
663	Balclutha, Otago ..	1·94	5·71	0·18	0·007	0·013	Greyish-brown	,, ..	0·23	0·19	0·25	0·08	Soil from experimental plots.
676 (1)	Pounawea, Otago ..	2·08	9·78	0·29	0·010	0·021	Light yellowish-brown	Faintly acid	0·42	0·21	0·05	0·08	Well supplied with available phosphoric acid; potash low.

Mechanical Analyses.

Laboratory No.	Description.	Residue on Washing.	Capillarity.	Capacity for holding Water.	Coarse Sand.	Fine Sand.	Silt.	Fine Silt.	Clay.	Moisture, &c.	Remarks.
521 (2)	Loose light-brown fine sandy loam	..	Very good	Very good	18·0	45·4	7·9	7·7	14·8	6·2	Gravel, 1 per cent.; fine gravel, 1 per cent.
(3)	Loose light-grey sandy soil ..	Very large (40%)	,,	Good ..	40·0	38·8	6·5	5·5	8·0	1·2	
522	Rather stiff light-brown sandy clay	Small ..	Good ..	Very good	5·0	36·9	13·1	11·4	28·3	5·3	
531	Dark greyish-brown sandy loam	Medium (pumice)	,, ..	Excellent	28·0	43·3	4·3	5·0	9·6	9·8	
566	Rather stiff brown fine sandy clay	Small ..	Poor ..	Very good	4·0	53·9	5·4	13·1	22·1	1·5	
591	Dark coarse sand	Very large (56%)	Good ..	Good ..	56·0	38·4	1·1	0·7	1·1	2·7	Trace fine gravel.
592	Light-brown fine sandy loam	Small ..	Fair ..	Very good	3·0	57·6	6·6	7·3	17·9	7·6	
614	Loose grey coarse sandy soil..	Very large (26%)	Excellent	Faintly acid	26·0	52·5	4·6	4·0	5·9	7·0	Trace fine gravel.
629 (1)	Friable greyish-brown coarse sandy loam	Large ..	Very good	Excellent	19·0	53·5	5·2	6·3	10·2	5·8	
(2)	Loose greyish-brown coarse sandy loam	Very large ..	Excellent	,,	26·0	48·7	5·6	6·8	8·0	4·9	
634	Stiff greyish-brown fine sandy clay	Medium ..	Fair ..	Very good	8·0	38·4	5·9	11·8	28·9	7·0	Gravel, 1 per cent.; fine gravel, 1 per cent.
646 (1)	Rather stiff fine sandy clay ..	Small ..	Fair ..	,,	3·0	34·3	7·9	13·2	40·2	1·4	Trace fine gravel.
(2)	,, ..	,, ..	,, ..	,,	2·0	37·6	7·6	13·9	32·4	6·5	,,
(3)	Light-brown fine sandy loam	Medium ..	Good ..	,,	6·0	54·5	7·9	10·0	19·4	2·2	,,
663	Grey fine sandy clay soil ..	Small ..	,, ..	Fair ..	3·0	55·5	6·7	9·7	20·2	4·9	,,
676 (1)	Grey coarse sand	Very large (35%)	Poor ..	,, ..	35·0	58·4	1·2	0·9	2·3	2·2	

ANALYSES OF SOILS—*continued.*

CHEMICAL ANALYSES.

Laboratory No.	Locality.	Volatile Matter.		Total Nitrogen.	Citric-acid Extract in Twenty Hours (Dyer's Method—Hall's Modification).			Reaction of Soil to Litmus.	Hydrochloric-acid Extract.				Remarks.
		At 100° C.	On Ignition.		Potash (K_2O)	Phosphoric Acid. (P_2O_5).	Colour of Extract on Ignition.		Lime (CaO).	Magnesia (MgO)	Potash (K_2O)	Phosphoric Acid (P_2O_5).	
676 (2)	Pounawea, Otago ..	3·84	11·73	0·31	0·031	0·015	Dark greyish-brown.	Acid ..	0·35	0·44	0·17	0·11	Well supplied with available plant-food.
678	Mana Island, Wellington	5·44	6·18	0·21	0·022	0·008	Greyish-brown	,, ..	0·33	0·23	0·33	0·076	Deficient in available and total phosphoric acid.
684	Fitzherbert Hills, Palmerston North	2·14	7·25	0·23	0·032	0·004	Brown ..	,, ..	0·25	0·25	0·15	0·06	Soil from experimental plots.
712	Tapanui, Otago ..	5·36	7·79	0·23	0·008	0·017	,, ..	,, ..	0·13	0·30	0·15	0·08	,,
713	,, ,, ..	3·52	8·23	0·23	0·010	0·019	Grey ..	,, ..	0·17	0·26	0·12	0·10	,,
714	Kelso, Otago ..	2·36	6·14	0·19	0·011	0·022	Light brown ..	,, ..	0·27	0·34	0·16	0·12	,,
715	,, ,, ..	4·10	6·74	0·21	0·007	0·033	Brown ..	,, ..	0·24	0·23	0·15	0·12	,,
719	Pomahaka, Otago ..	4·12	8·00	0·23	0·012	0·021	Light brownish-yellow	,, ..	0·16	0·29	0·21	0·16	,,
720	,, ,, ..	7·46	9·42	0·28	0·008	0·028	Dark brown ..	,, ..	0·35	0·51	0·26	0·18	,,
733	Tapanui, Otago ..	4·46	7·35	0·25	0·015	0·031	Light brown ..	,, ..	0·50	0·66	0·32	0·23	,,
734	Heriot, Otago ..	4·42	7·81	0·26	0·008	0·032	Brown ..	,, ..	0·30	0·47	0·27	0·19	,,
755	Roxburgh, Otago ..	2·24	4·67	0·17	0·007	0·024	Greyish-brown	,, ..	0·32	0·53	0·25	0·17	,,
787	Popaama, Waimarino	15·92	32·59	0·73	0·025	0·043	Pinkish-grey ..	,, ..	0·44	0·18	0·09	0·44	Well supplied with available plant-food.
792 (1)	Otapiri Gorge, Southland	4·46	10·68	0·25	0·017	0·012	Light greyish-brown	,, ..	0·32	0·48	0·15	0·12	Soil from experimental plots.
(2)	Ditto	4·02	10·57	0·26	0·013	0·016	Light brown ..	,, ..	0·21	0·58	0·17	0·13	,,
803 (1)	Otaio, Canterbury ..	1·76	4·58	0·17	0·013	0·034	,, ..	,, ..	0·57	0·37	0·21	0·13	,,
(2)	,, ,, ..	2·28	6·94	0·25	0·030	0·030	,, ..	Faintly acid	0·53	0·45	0·20	0·13	,,
804	Studholme, Canterbury	3·52	9·45	0·30	0·032	0·017	Brown ..	Acid ..	0·50	0·48	0·43	0·28	,,
805 (1)	Waimate, Canterbury	1·94	5·53	0·20	0·015	0·017	Light greyish-brown	,, ..	0·45	0·30	0·21	0·10	,,
(2)	,, ,,	2·50	6·95	0·25	0·021	0·022	Ditto ..	,, ..	0·54	0·39	0·24	0·16	,,

Mechanical Analyses.

Laboratory No.	Description.	Residue on Washing.	Capillarity.	Capacity for holding Water.	Coarse Sand.	Fine Sand.	Silt.	Fine Silt.	Clay.	Moisture, &c.	Remarks.
676 (2)	Light-yellow fine sandy clay..	Very small ..	Good ..	Good ..	1·0	58·8	3·4	7·7	26·9	2·2	Trace fine gravel.
678	Dark-brown fine sandy loam	Fairly small	Poor ..	Poor ..	9·0	53·3	6·6	6·9	18·6	5·6	
684	Light-brown fine sandy loam	Fairly large	Good ..	Very good	11·0	58·0	6·0	8·4	13·9	2·7	
712	Fairly friable grey fine sandy clay	Very small ..	Fair ..	,,	1·0	53·5	9·1	10·7	22·6	3·1	Trace fine gravel.
713	Fairly friable grey fine sandy loam	Small ..	Good ..	,,	2·0	52·7	11·9	11·0	16·9	5·5	,,
714	Grey fine sandy loam ..	Very small ..	,, ..	,,	1·0	54·2	10·3	10·9	20·8	2·8	,,
715	,, ..	,, ..	,, ..	,,	1·0	49·9	9·1	12·5	22·8	4·7	,,
719	Grey fine sandy clay ..	Small ..	Very good	,,	4·0	42·4	9·4	13·6	29·6	1·0	Fine gravel, 1 per cent.
720	,, ..	,, ..	Good ..	Good ..	2·0	59·4	7·6	8·6	20·4	2·0	Trace fine gravel.
733	Friable grey fine sandy loam	,, ..	Very good	,, ..	2·0	56·1	7·6	10·4	19·8	4·1	,,
734	Grey fine sandy loam ..	Very small ..	,,	Fair ..	1·0	58·6	9·3	9·1	19·0	3·0	,,
755	Greyish-brown fine sandy loam	Medium ..	,,	,, ..	10·0	55·1	8·6	6·5	16·0	3·8	Fine gravel, 1 per cent.
787	Dark-brown fine sandy loam..	,, ..	,,	Very good	7·0	55·6	4·8	3·4	16·4	12·8	
792 (1)	Light-brown fine sandy clay soil	Small ..	,,	,,	4·0	48·6	4·6	8·8	27·3	6·7	Trace fine gravel.
(2)	Ditto	Medium ..	Good ..	,,	6·0	48·3	4·1	9·4	31·0	1·2	
803 (1)	Grey fine sandy loam ..	Small ..	,, ..	Fair ..	5·0	57·8	10·6	9·1	14·4	3·1	
(2)	,, ..	Very small ..	,, ..	Good ..	1·0	52·1	13·7	14·0	17·8	1·4	
804	,, ..	Small ..	Fair ..	,, ..	2·0	54·9	8·0	10·6	19·0	5·5	
805 (1)	,, ..	,, ..	Good ..	,, ..	4·0	50·1	13·8	12·1	16·5	3·5	Trace fine gravel.
(2)	Grey fine sandy clay ..	,, ..	,, ..	Fair ..	4·0	39·7	12·3	15·9	24·6	3·5	

ANALYSES OF SOILS—*continued.*

CHEMICAL ANALYSES.

Laboratory No.	Locality.	Volatile Matter.		Total Nitrogen.	Citric-acid Extract in Twenty Hours (Dyer's Method—Hall's Modification).			Reaction of Soil to Litmus.	Hydrochloric-acid Extract.				Remarks.
		At 100° C.	On Ignition.		Potash (K_2O)	Phosphoric Acid. (P_2O_5).	Colour of Extract on Ignition.		Lime (CaO).	Magnesia (MgO)	Potash (K_2O)	Phosphoric Acid (P_2O_5).	
826	Waitaki, Canterbury..	2·62	8·03	0·23	0·013	0·021	Brown ..	Acid ..	0·33	0·24	0·27	0·12	Soil from experimental plots.
827	,, ,, ..	3·66	10·03	0·37	0·030	0·053	Light brown ..	Neutral ..	0·88	0·62	0·33	0·27	,,
828	,, ,, ..	1·80	5·91	0·25	0·065	0·049	Light greyish-brown	Faintly acid	0·45	0·32	0·27	0·20	,,
829	,, ,, ..	2·60	7·00	0·25	0·033	0·024	Greyish-brown	Acid ..	0·35	0·41	0·25	0·18	,,
834	Manutahi, Wellington	3·96	10·29	0·30	0·048	0·031	Dark reddish-brown	Faintly acid	0·22	0·13	0·13	0·18	Well supplied with available plant-food.
849 (1)	Lawrence, Southland	3·60	11·64	0·183	0·010	0·035	Dark brownish-red	Acid ..	0·50	0·28	0·17	0·37	Fairly well supplied with plant-food.
(2)	,, ,,	3·18	11·26	0·169	0·019	0·028	Dark brown ..	,, ..	0·43	0·24	0·13	0·31	Ditto.
914	Kohatu, Nelson ..	2·62	8·71	0·241	0·010	0·019	Light greyish-brown	,, ..	0·34	0·24	0·13	0·13	,,
917	Taumarunui, Wanganui River	15·28	25·45	0·350	0·029	0·033	Very light brown	Faintly acid	0·24	0·26	0·12	0·44	Well supplied with available plant-food.
939 (1)	Otaraia, Southland ..	5·08	14·43	0·450	0·026	0·045	Brown ..	,,	0·36	0·85	0·29	0·44	Rich in available phosphoric acid, and well supplied with available potash. Deficient in lime.
(2)	,, ,, ..	3·52	12·00	0·270	0·019	0·035	Dark brown ..	,,	0·20	0·58	0·21	0·23	Well supplied with available phosphoric acid and potash. Deficient in lime.
941	Kopua, Hawke's Bay	8·32	16·88	0·340	0·020	0·028	Light brown ..	,,	0·33	0·37	0·26	0·25	Well supplied with available plant-food.
943	Waipu, North Auckland	15·90	18·19	0·249	0·003	0·009	Yellowish-white	Acid ..	0·15	0·18	0·23	0·17	Deficient in available potash and phosphoric acid.
1072	Hamilton, Waikato ..	6·04	10·89	0·344	0·078	0·139	Light greyish-brown	Neutral ..	0·90	0·08	0·17	0·45	Exceptionally rich in available potash and phosphoric acid.

Mechanical Analyses.

Laboratory No.	Description.	Residue on Washing.	Capillarity.	Capacity for holding Water.	Coarse Sand.	Fine Sand.	Silt.	Fine Silt.	Clay.	Moisture, &c.	Remarks.
826	Fine sandy loam	Small ..	Fair ..	Good ..	3·0	45·8	13·2	13·0	23·1	1·9	Fine gravel, 3 to 4 per cent.
827	„	„ ..	Good ..	„ ..	3·0	52·8	19·0	9·5	10·3	5·4	Trace fine gravel.
828	„	„ ..	„ ..	Fair ..	2·0	52·1	17·8	11·2	14·7	2·2	„
829	„	„ ..	„ ..	„ ..	4·0	51·5	13·8	10·0	18·0	2·7	„
834	Loose coarse sandy soil ..	Very large ..	„ ..	Very good	46·0	33·7	6·5	4·5	6·6	2·7	
849 (1)	Coarse sandy loam	Medium ..	Fair ..	Excellent	11·0	60·9	4·8	6·0	12·3	5·0	Traces gravel and fine gravel.
(2)	„	Fairly large	Very good	Very good	14·0	53·5	6·5	7·9	15·0	3·1	Gravel, 2 per cent.; fine gravel, 2 per cent.
914	Coarse sandy clay	Medium ..	Good ..	„	15·0	52·0	3·6	7·3	16·3	5·8	Gravel, 5 per cent.; fine gravel, 5 per cent.
917	Light-brown fine sandy loam	Small ..	Very good	Excellent	5·0	68·2	3·6	4·6	7·0	11·6	
939 (1)	Brown coarse sandy loam ..	Very large (27%)	..	..	27·0	42·6	3·5	7·0	15·8	4·1	Fine gravel, 50 per cent.
(2)	Brown fine sandy clay ..	Small ..	Very good	Very good	4·0	55·5	3·1	8·4	26·9	2·1	Trace fine gravel.
941	Loose coarse sandy loam ..	Medium ..	Excellent	Excellent	10·0	69·3	3·6	4·9	5·2	7·0	Fine gravel, 1 per cent.
943	Very dark coarse sandy clay soil	Very large ..	Poor ..	Good ..	36·0	27·6	2·6	4·0	23·8	6·0	
1072	Coarse sandy loam ..	„ ..	Fair ..	„ ..	40·0	35·9	4·2	6·6	9·8	3·5	Gravel, 5 per cent; fine gravel, 5 per cent.

THE NECESSITY FOR TESTING RYE-GRASS.

A. H. COCKAYNE.

THE necessity for accurately determining the germination of grass and clover seeds cannot be too strongly impressed upon all farmers. Without the knowledge of the percentage of living seeds present it is manifestly impossible to ascertain the *quantity* of seed that is required to sow a definite area. It is obvious that 1 lb. of seed germinating 100 per cent. will produce as many and probably more vigorous plants than 4 lb. of an inferior line germinating only 25 per cent.

FIG. 1.—PERENNIAL RYE-GRASS, SHOWING A GERMINATION OF 10 PER CENT. IN SEVEN DAYS.

Thus in estimating the amount sufficient to sow an acre the number of plants necessary to form a good sward is of prime importance. The weight of seed required to produce the optimum number of plants necessary for grassing purposes can therefore only be determined when

the germination coupled with the approximate number of seeds per pound has been ascertained. All our present-day formulas are based on the actual weight of seed that is to be used, and not, as they should be, on the number of plants that are necessary to form a satisfactory pasture. These formulas naturally presuppose an average germination, a condition that by no means always obtains, especially

Fig. 2.—Perennial Rye-grass, showing a Germination of 90 per Cent. in Seven Days.

when the seed has been grown and harvested under unfavourable conditions, or may have lost its vitality through other causes.

During the present season it is necessary to emphasize the urgent need of germinating all perennial rye-grass before it is sown. In most years New Zealand rye-grass is nearly always quite satisfactory so far as germination is concerned, but owing to the bad harvest much of the 1912 crop is of very inferior quality. The two illustrations serve to show the great variation that may occur in the vitality of seed that has been harvested in the same locality. Fig. 1 shows a germination of only 10 per cent. in seven days, while Fig. 2 shows a growth of 90 per cent. during the same period. It will also be noted that the seeds in Fig. 2 are producing much more vigorous shoots than those of Fig. 1. One pound of seed of Fig. 2 will produce approximately

as many vigorous plants as 9 lb. of that of Fig. 1. The value of the seed of the good sample is roughly 5s. 3d. per bushel, so that the real value of the other is 7d. per bushel. These two illustrations give a clear idea of the value of ascertaining germination.

So far as rye-grass is concerned, its germination is exceedingly simple. One hundred seeds should be counted out and placed on a damp piece of blotting-paper or flannel. This should be placed on a plate and covered either with a piece of glass or another plate inverted over the other. Care should be taken to see the paper or flannel does not get dry, and the glass or plate should not fit so tightly as to exclude a circulation of air. At the end of seven days the seeds that have sprouted should be counted and the number will give the germination percentage of the sample. All the living seeds may not have germinated within the seven days, but if the seed is good the majority will have done so. The temperature of an ordinary living-room is quite suitable for the testing of rye-grass seed.

The younger generation of farmers is being recruited from the brightest and best educated of our young men, particularly from the graduates of the agricultural colleges, and these recruits are rapidly putting into practice everything worth while from the researches of our agricultural institutions. These young men are taking up farming with their eyes open. They realize that the farmers of the future will have to meet much sharper competition and be content to cultivate many acres of less fertile soil than those who cleared the virgin forests or broke the prairie sod, but they also see clearly that the population of the country is increasing more rapidly than the number of farms, the number of farmers, or the yield of farm-products, and that this increasing population must have food and the materials from which clothing is made.—*U.S. Experiment Station Record.*

Seed Grain.—An announcement of interest to grain-growers is contained in a local seed catalogue. This is that farmers may have their seed grain machine-dressed at a cost of 3d. a bushel. This modest charge, coupled with the fact that the Government railways carry the seed grain one way free, should encourage general adoption of dressing the seed for all grain crops. Apart from the fact that all impurities are thereby eliminated, the dressing naturally ensures a very much improved sample, by reason of the removal of light and small grain; indeed, where cereals are properly machined before being sown the farmer is provided with grain which has undergone a rough process of seed-selection, which must lead to enhanced returns. By using only machine-dressed seed (and this at a premium of 6d. an acre) the farmer is practically taking out an insurance policy against weeds and inferior grain.

THE TITAN OIL-TRACTOR AT RUAKURA FARM OF INSTRUCTION.

DEHORNING.

PRIMROSE MCCONNELL.

LEST some readers of this article may think I have not been taught to realize the beauty (?) of horns, I may say that I was brought up in a district where the horn was, and still is, worshipped as a kind of fetish—namely, among the pedigree Ayrshire herds of Ayrshire. Among those herds it is nothing uncommon to see young bulls and heifers tied up in stalls with a cord attached to the horn, passed through an overhead pulley, and a weight attached to the end of the cord, with the object of training the horn to the desired shape. The process is accompanied with a good deal of filing and paring, and to hasten the process I have sometimes seen a partially cooked swede transfixed to the horn in order to render it more pliable; and the whole work carried out with as much anxiety as you might expect from a Chancellor of the Exchequer when preparing his budget. In fact, at one time many breeders were more anxious about the shape of the heifer's horns than they were about her future performance as a milk-producer.

Properly speaking, horns can be classed only as a relic of barbarism, and entirely out of place in a civilized community. In the days of barbarism the hornless bovine had to "go to the wall," while those with horns flourished. Less than a hundred years ago the majority of Ayrshire cattle had horns which curved downward and inward; and I contend that if we still continue to be foolish enough to maintain and train the horn, that is the shape they ought to take, as being less likely to cause damage to the herd in general and other herds with which they may come in contact. If we read the history of the Ayrshire we find that many farmers at one time preferred cows without any horns, and it was about the middle of the nineteenth century that the present dagger-like shape of the horns became a craze, and about the same time came the still worse craze of the small teat and the tight udder.

Taking all horned breeds into consideration, the yearly loss caused by horns must be enormous, not only in dairy stock but also in beef cattle, through damaged hides and carcases.

I am quite convinced that a hornless herd of cows will yield considerably more milk than a similar herd with horns, not taking

into account the direct loss through prods and bruises, which latter, although they may not seem much outwardly, undoubtedly affect the milk-yield. Dehorning renders a herd altogether more docile and less timid, and such qualities in a milking herd help considerably in making a big record. The old saw, "Milk does not grow on horns," may be much hackneyed, but it is none the less true; and it is equally true that milk does grow best where dehorning is in vogue. As to the "beauty" of horns, it is merely a matter of fashion, and I have never yet found the horn-admirer who could give any practical reason for his fad.

Would the breeders of the Red Poll, Polled Angus, or Galloways consider their herds improved by the addition of horns? I think not. I have seen so much of the evils of horns and the great loss caused by them that I am more than convinced that dehorning should be made compulsory, particularly among dairy stock, and that the retention of the horn is not only the cause of enormous loss but it is absolutely barbarous. We in New Zealand profess to be practical in all things pertaining to the breeding of stock, especially when compared with the British, but the fact is that we are not honest with ourselves. We preach against all manner of faking, but on the quiet we wink at and encourage it; while the Britisher openly encourages it and as openly carries it out—not only so, but he practises it to such perfection that one cannot but admire his art. At many New Zealand shows, although the rules are most emphatic on this point, faking is carried on unblushingly, and even encouraged by many of the judges. The writer will yield to no one in his desire to see stock turned out to the highest point of perfection that can be obtained by legitimate means, but to go further than this is in his opinion foolish and serves no practical end.

Failing compulsory dehorning, the points that are allotted to horns should be entirely eliminated from the judges' scale, particularly in judging a dairy cow; and a cow that has her horns trained upward and outward I would either debar entirely or deduct so many points from the total scale. A judge that will debar a milking-cow simply because she happens to be dehorned is, in my opinion, not a judge at all but a faddist—unless, of course, he is bound by the rules of the association. Many breeders, even of pedigree Jerseys, would dehorn to-morrow were they certain that it would not affect their chances in the show-ring.

In dehorning the most humane way is, no doubt, to apply caustic when the calf is but a few days old. When the operation is performed on a mature animal with a dehorning-instrument, care should be taken to go as close as possible, also to cut the horn on a line with the

slope of the head. When the horn is not cut close enough a short stump will soon appear, which is most unsightly, while a well dehorned animal will show a head like a polled Angus with no vestige of horn visible. An unruly bull should be dehorned at once, and it is astonishing how the operation will quiet him.

The loss of life caused by attacks from horned bulls is, I am sure, greater than we realize; and any one who, like the writer, has been for a few minutes at the mercy of a bull's horns is not likely to hesitate in the matter of dehorning. In Ayrshire many fatal cases have occurred to my own knowledge, not to speak of numerous cases of serious and permanent injury, and yet the Ayrshire breeder continues to supply his stock with the most up-to-date means of destruction in the shape of horns.

Owing to the indiscriminate slaughtering of cows, a decrease of one million head of cattle in the Province of Entre Rios is reported during the past two years. It is suggested that a head tax of 17s. 6d. on all cows be charged, and that the killing of female calves be prohibited. This should be productive of a good increase in a short time.—*New Zealand Government Correspondent at Buenos Aires.*

It is estimated that there are about 100,000 agricultural associations and societies in the Northern Hemisphere. Germany possesses the greatest number—24,486; America comes next with 17,724; then France, with 12,156; Austria-Hungary has 9,723; Japan, 5,149; Italy, 4,523; Belgium, 3,844; Switzerland, 3,287; the Netherlands, 2,779; Sweden, 2,622; British India, 1,766; Denmark, 1,756; Great Britain and Ireland, 1,394; Servia, 853; Norway, 700; Finland, 696; and Roumania, 103. What an enormous amount of agricultural activity and organization the total represents!

Fumigating Rabbit-burrows.—Mr. Duncan Fraser, Bull's, writes: In fumigating rabbit-burrows with carbon-bisulphite, I proceeded in the following way: Having tied a piece of saturated wool to the end of a small stick or wire, I pushed it about 3 ft. into the burrow and then ignited it by throwing in a lighted match; immediately afterwards I threw a sack over the mouth of the burrow. About thirty seconds later I pulled the sack a little, so as to leave a small aperture to create a draught. I chose a time when a slight breeze was blowing on to the burrow. In about ten minutes from time of ignition the fumes had travelled a chain in several directions, and the outlets of the burrow were then easily found by the exit of the fumes. The outlets were then closed by a sod or bag. The fumes remain in the ramifications of the burrow fully twelve hours. I fail to see where you can get a better fumigator than nature provides.

SOME INSTRUCTIVE EXPERIMENTS.

CONDUCTED BY A FREEZING-WORKS COMPANY.

In fields attached to its works at Belfast, Canterbury, the Canterbury Frozen-meat Company conducted a number of valuable experiments during the past season in co-operation with the Department.

Silver-beet, or Swiss chard, has provided the most instructive demonstration. This plant, introduced by the Department, was made

Sheep eating off the Second Growth of Silver-beet on the Test Plots at the Canterbury Frozen-meat Company's Property, Belfast, last Month.

the subject of investigation in order to discover if it would prove an effective substitute for roots and rape in the feeding of sheep. The first year's experience at Belfast confirms previous experiments, which went to show that while immune to the diseases which make turnips and rape precarious crops, it provides a crop which, eaten off at intervals, will last from season to season.

In the beginning of the present month the quarter-acre plot of silver-beet was being eaten off by twenty quarter-bred sheep. The first feeding-off was in April, and a second feeding was ready in June, but owing to the wet weather the land could not be stocked. The delay in feeding proved that the plant does not deteriorate with

keeping. The Belfast experience goes to show that the beet could probably be fed off five times in the season, given favourable weather, and then probably would not be exhausted. The first stripping of the silver-beet (to test the weight of forage produced) gave a yield of 51·7 tons per acre before stocking. At the first feeding 244 sheep per acre were maintained for fourteen days. The sheep, strong stores, rapidly improved in condition on the feed, and did not show any sign of scouring. The crop was in no way affected with the ordinary blights which have given great trouble on turnip and rape crops in the district.

THE BUDA KALE PLOT AT BELFAST.
Photographed last month. Ready to be fed off for the third time.

Buda kale is another forage plant—introduced by the Department last season—which has given most promising results at Belfast. The first stripping gave 27 tons to the acre, or 54 tons to the two strippings. The crop of the quarter-acre plot has been fed off twice. It carried 216 sheep per acre for fourteen days on the first occasion, and 214 on the second feeding. It is now ready to feed off for the third time, and the development of the plants indicates that it will probably provide the same feeding-material for the third time.

Under the same treatment as Buda kale, rape was fed off twice, and then was quite done. It is probable a fourth feeding will be secured from the Buda kale plot. If this proves to be the case it

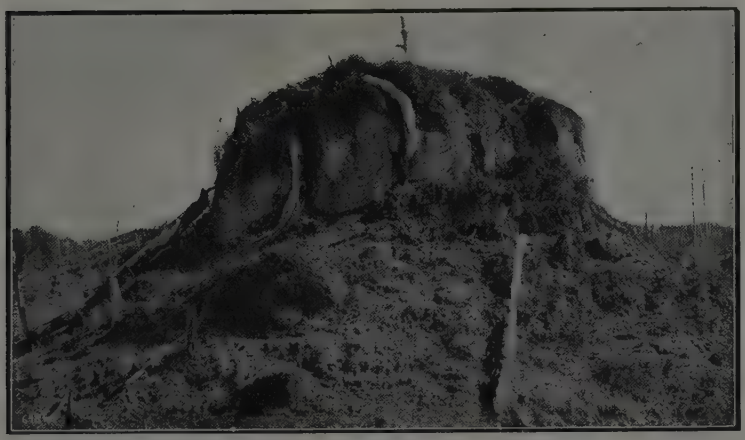
will mean that the plant will provide the farmer with a continuous green crop from season to season.

Altogether 663 sheep have been wintered on the produce from 4 acres of experimental plots, and the feed is by no means yet exhausted.

On the same plots mangels produced 81 tons to the acre, swedes 71 tons, Chou Moellier 85 tons, and kohlrabi 62 tons. It should be emphasized that the land on which these experiments were conducted was specially prepared for the purpose. Twelve months ago it was subject to flooding and was covered with weeds. By drainage and thorough cultivation it was made into a fine seed-bed. After-cultivation was well maintained, weeds being thus effectively suppressed and the soil being kept free and open. This thorough treatment has conclusively demonstrated its efficacy in the exhibition crops which have been produced.

Following is the analysis of the manure used on the Belfast plots, also the amount of each constituent applied per acre :—

		Per acre. lb.
Insoluble nitrogen	1·8 per cent.	6·05
Soluble phosphoric anhydride	4·1 ,,	13·77
Insoluble ,, ..	8·9 ,,	29·90
Dipotassic oxide	3·0 ,,	10·08



TYPICAL SCENE ON THE BUSH-SICK COUNTRY SELECTED BY THE GOVERNMENT FOR EXPERIMENTAL PURPOSES.

INOCULATING THE SOIL.

LESSONS FROM CO-OPERATIVE EXPERIMENTS.

G. DE S. BAYLIS.

AT the Marton plots in 1910 several plots of peas were grown. The colour of the peas harvested was good, but the growth and the yield, especially the latter, was poor. Half of the land had been limed at the rate of 5 cwt. of ground limestone per acre. The growth on the limed portion was infinitely superior to that upon the unlimed portion; but upon neither portion could any pea-roots be found with the bacterial nodules usually found on the roots of a healthy crop of peas.

Briefly, the notes upon the result of the 1910 pea-plots at Marton stated that while the peas grown were reported upon as of good quality and colour, and quite suitable for the export trade, the yield obtained, neither on the limed nor the unlimed portion, was as good as might have been expected, although the yield was decidedly better on the limed portion, where the vines made a heavy growth.

In consequence of the results of this experiment it was decided to see what could be done in 1911 by spreading and harrowing in a small quantity of soil taken from a field which had grown peas with abundant nodules upon the roots. The balance of the plot was therefore limed at the same rate—viz., 5 cwt. per acre—and, somewhat late in the day, in fact after the peas were half-grown, a little inoculated soil was procured and roughly harrowed in. (This should really have been done before the peas were sown.)

Where peas, lucerne or suchlike crops are grown under conditions which prevent the formation of the bacterial nodules the colour is usually of a yellowish tinge, although the growth may in some cases be fairly good. This was very noticeable on examining the peas about ten days to two weeks after the land had been inoculated. The inoculated soil had been sown by hand, and the exact places where it had fallen could more or less be traced by the colour of the foliage.

On examination it was found that those plants which had assumed a deep green tinge were nodule-bearing, while those having a yellow tinge had not yet formed nodules. On further examination of a great

many individual plants in several different parts of the plot it was seen that the number of pods borne on inoculated vines always largely exceeded those borne on vines having no nodules.

This simple experiment is merely an illustration of what is happening upon several soils which, for some reason or other, are not naturally well stocked with those particular forms of bacterial life which are beneficial, it might almost be said a necessity, to the success of leguminous plants.

The possibility of inoculating such soil, by spreading over it some soil taken from under a crop of a similar variety bearing nodules—even so small a quantity as 200 lb. or 300 lb. per acre—takes us a step further in the important work of maintaining and increasing the desired supplies of plant food in the soil. It has to be remembered that in the growing of leguminous crops the soil may be limed freely, and it may be cultivated and fertilized upon the most scientific lines, yet if it is wanting in the necessary bacterial life the yield desired will not be secured. The yield, in fact, may not even pay the cost of growing, and it is possible that, with crops like lucerne, they may perish.

This may seem to be placing undue stress upon the value of certain forms of bacterial life within the soil, and it is well known that few soils are absolutely destitute of these, and, if properly limed, cultivated, and fertilized, such bacteria will quickly increase in numbers.

A short-lived crop like the pea and a delicate plant like young lucerne cannot wait until bacteria are evolved, and here soil-inoculation is a means which may decide between the success or failure of the crop. At the same time it must not be thought that introducing bacterial forms of life by means of inoculation is the one and only avenue to success. Bacteria we desire in the soil cannot thrive in land ill drained, poor in lime or humus, and improperly cultivated, or do the good they should in the absence of phosphoric acid and other needful plant-food. Good cultivation, lime, and bacteria are all necessary for the production of profitable crops. Where these two first essentials are present and yet legumes are unable to form their characteristic nodules soil-inoculation is imperative. This will be found to apply to many new soils. By introducing the desired bacterial flora the yield of such crops as peas, beans, &c., can be enormously increased in comparison to the yield obtained without soil-inoculation.

Since storing the mangel varieties at Ruakura Farm of Instruction, Jersey Queen has kept better than any other variety, the disease Rhizoctonia making little progress.

SEED POTATOES.

NECESSITY OF PROPER SELECTION.

J. DRYSDALE.

It is most extraordinary that in these days, when so much importance is being attached to the pedigree of seeds and animals for breeding purposes, so little attention should be paid to the selection of seed for such an important crop as the potato—in fact, that the accepted principles of breeding should in the case of potatoes be absolutely reversed. Instead of the seed being selected according to type and vigour, and only from the best plants in the crop, it is a common practice to take the seed in an indiscriminate manner from the harvested tubers, and then use only the smaller specimens for the important work of continuing the species. In other words, in place of the most typical and most vigorous tubers being chosen for seed purposes, it is actually the worst that are taken. This is no wild assertion: so general, indeed, is the practice that merchants in supplying seed send out potatoes which have been quite discarded for ordinary market purposes—more of a type generally regarded as "pig potatoes" than as being suitable for seed. Specimens are here illustrated of the type of potato supplied by a reputable seed firm for planting this season, alongside a fair specimen of the same variety sold by the firm for table purposes.

In selecting potatoes for seed purposes it is not to be supposed that size is everything. The large gross specimen is just as undesirable as a small weedy tuber. The plants in the field should be studied, and roots of the most thriving and vigorous ones examined for the desired seed. In choosing the seed potato, the first thing to see to is that the tuber is of the correct type of the particular variety. Having this, the medium size should be preferred, providing—and this is a most important point—the eyes are well defined, and suggestive of strong development. A large number of eyes is not always desirable, just as merely one or two eyes are a weakness. A tuber with a medium number of eyes is the best type to choose. The selected potatoes should be carefully stored in a cool place, and preferably greened off before planting.

I am convinced that, if the sound rule were consistently observed—to select only the strongest and best types of potatoes as sets for the subsequent crop—less would be heard of blight and failure. Constitution in potatoes, as in everything else the farmer produces, is of paramount importance. No farmer who expects to make a success of grain-growing would think for a moment of selecting his "seconds" for seed purposes, either in wheat, oats, or barley; and, just as the culls of a flock or herd are the last chosen for perpetuating the species, so the undersized tuber, selected at random, and with no indication of constitutional vigour, should never be planted if a profitable and healthy crop is to be expected.

Up-to-Date.—Table Specimen.

Up-to-Date.—Seed Specimen.

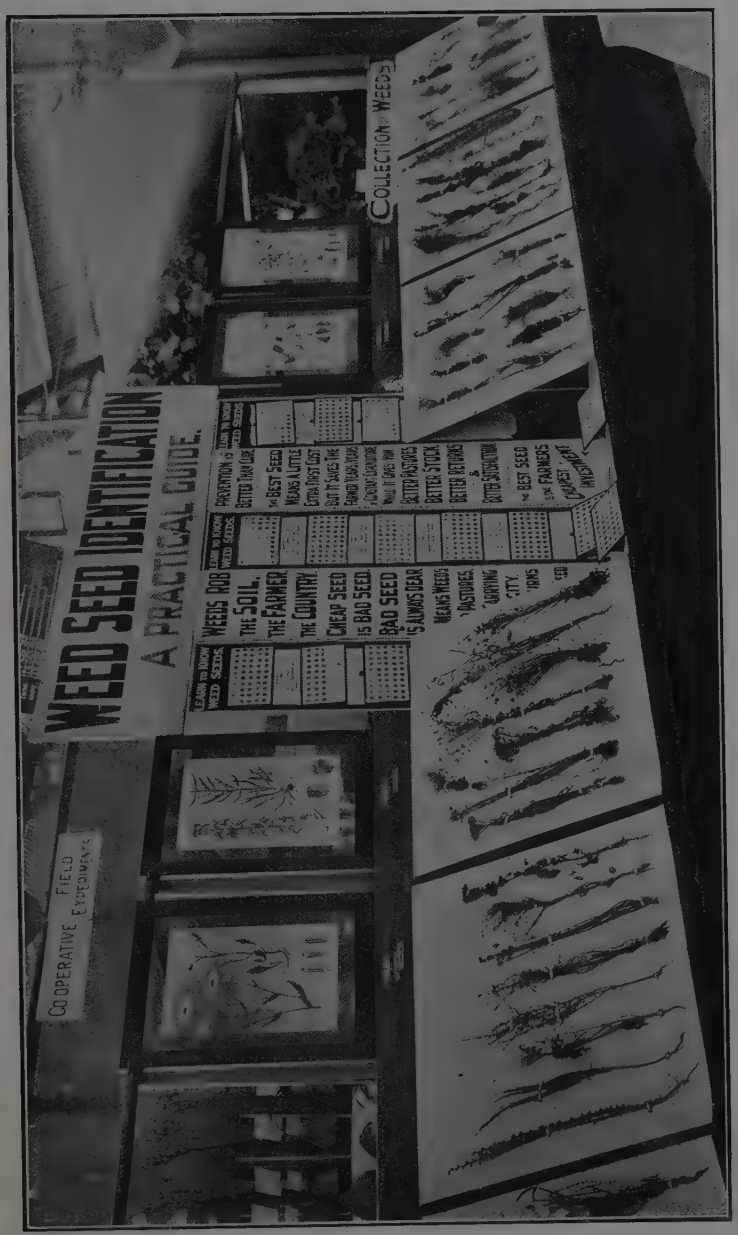
At the Weraroa Experimental Farm, where the selection of seed potatoes has been carefully observed on the rules laid down above, the resultant crops have been singularly free from blight. Experiments are now in progress to determine whether, after using from season to season generations of the one type of selected seed, it is not possible to be quite independent of spraying for blight. During the past season the Weraroa selected seed has proved immune; but before making a definite pronouncement on the subject it must be further investigated.

PERENNIAL RYE-GRASS SEED.

A. H. COCKAYNE.

IT may be said that all the perennial rye-grass used in New Zealand is of local origin. A small amount is imported during certain years, but the quantity is so slight as to be not worth consideration. There is quite a large export trade carried out with New Zealand rye-grass, that shipped being, in the main, southern seed with a bushel weight of over 28 lb. There are at least three distinct types of seed produced here, southern (Canterbury, Otago, and Southland), East Coast (Hawke's Bay and Poverty Bay), and Manawatu (Sandon). The finest and heaviest rye-grass and that commanding the highest price is that from the East Coast, while during the last few seasons that produced in the Manawatu district has been looked upon with great favour. Southern seed of over 28 lb. bushel weight is also of excellent quality, but it is not favoured in many parts of the North Island, as much of it is harvested from comparatively young pasture and is said not to hold on many of the North Island soils. There is also a prejudice in certain quarters against southern seed on account of the amount of Californian thistle in many of the southern districts, but I have never noted seed of this thistle in any machine-dressed rye-grass I have examined. The argument that rye-grass will not hold on many soils is perfectly correct and is sound for seed produced in any part of the Dominion. Much money has been wasted in the past in sowing rye-grass in localities that are unsuitable.

The past season has been in general a bad one for harvesting the crop, and in consequence there is a good deal of seed that is of inferior quality. This is especially true of that produced in the Manawatu district. Up till this year seed of 30 lb. and over was quite a common weight for Sandon rye-grass, but this season much of this seed is under 24 lb. per bushel, and its germination in many cases has been extremely bad. This very unsatisfactory condition of much of the Manawatu seed is due entirely to the abnormal amount of wet weather experienced both in the summer and autumn. It would certainly be a good policy for farmers who sow Sandon seed to have it tested for germination, and in cases where the tests are very low an allowance should be made when sowing for increasing the amount used per acre. The same remarks equally apply to a good deal of the southern seed that is of low bushel weight.



The Weed-seed Display of the Department at the Christchurch Poultry Show.

GERMINATION.

The average germination of 127 samples has been 64·5 per cent., with a minimum of 16 per cent., and a maximum of 100 per cent.:—

38	samples germinated	between	90	and	100 per cent.
28	,,		80	,,	90 ,,
21	,,		70	,,	80 ,,
7	,,		60	,,	70 ,,
8	,,		50	,,	60 ,,
7	,,		40	,,	50 ,,
8	,,		30	,,	40 ,,
8	,,		20	,,	30 ,,
2	,,		16	,,	20 ,,

Germination of Hawke's Bay Seed.—At the 1908 Autumn Show of the Hawke's Bay Agricultural and Pastoral Association I took samples of all the rye-grass seeds that were exhibited, and which had all been harvested in the early part of 1908. In February, 1909, the samples were tested, and in August, 1911, the same samples were retested. They had been kept during the whole of the period in the laboratory in corked tubes. The following is the result of the two tests:—

Mark.	Germination, February, 1909. Per Cent.	Germination, August, 1911. Per Cent.
116	99	96
117	69	33
118	99	97
119	98	100
120	97	97
121	96	94
122	88	78
123	97	91
124	97	95
125	98	98
126	99	97
127	99	98
128	98	98
129	98	95
130	99	99

These fifteen samples are still being kept, and it is proposed to retest them each year. From the above it can be seen that the majority gave a very high test in August, 1911, the seed being then over three years old. Nos. 117 and 122, which were the lowest in germination at the time of the first test, showed a falling-off in germination capacity on being retested, No. 117 diminishing by 36 per cent. and No. 122 by 10 per cent. Hawke's Bay seed of the 1911 crop was tested at the same time as the 1908 samples were retested, and showed a more rapid germination energy. In the case of the 1911 seed, germination commenced within forty-eight hours, while the 1908 seed did not start until seventy-two hours had elapsed.

The above experiment seems to indicate that Hawke's Bay rye-grass, which germinates very high in its first year, does not deteriorate

for some years when probably stored in a dry atmosphere, while seed that germinates under 90 per cent. will deteriorate much more rapidly even when stored under the same conditions. Careful experiments on the longevity of rye-grass seed would appear to yield results that would be of great value in the marketing of this crop.

Extraneous Seeds in Rye-grass.

Fifty-two samples of rye-grass examined for purity contained thirty-one different kinds of extraneous seeds. Their names and relative frequency were as follows:—

1.	Goose-grass (*Bromus hordeaceus*)	occurred in	50 of the samples.
2.	Hair-grass (*Festuca bromoides*)	,,	35 ,,
3.	Sorrel (*Rumex acetosella*)	,,	32 ,,
4.	Italian rye-grass (*Lolium italicum*)	,,	23 ,,
5.	Suckling clover (*Trifolium minus*)	,,	23 ,,
6.	Catsear (*Hypochaeris radicata*)	,,	23 ,,
7.	Fog (*Holcus lanatus*)	,,	15 ,,
8.	Rib-grass (*Plantago lanceolata*)	,,	12 ,,
9.	Sweet-vernal (*Anthoxanthum odoratum*)	,,	10 ,,
10.	Curled dock (*Rumex crispus*)	,,	8 ,,
11.	Alsike (*Trifolium hybridum*)	,,	7 ,,
12.	Crested dogstail (*Cynosurus cristatus*)	,,	6 ,,
13.	Cocksfoot (*Dactylis glomerata*)	,,	6 ,,
14.	Hawkbit (*Leontodon hispidus*)	,,	5 ,,
15.	White clover (*Trifolium repens*)	,,	5 ,,
16.	Wild turnip (*Brassica campestris*)	,,	5 ,,
17.	Toad-rush (*Juncus bufonius*)	,,	4 ,,
18.	Australian linseed (*Linum marginale*)	,,	3 ,,
19.	Buttercup (*Ranunculus parviflorus*)	,,	2 ,,
20.	Soft fog (*Holcus mollis*)	,,	2 ,,
21.	Meadow-grass (*Poa pratensis*)	,,	2 ,,
22.	Native foxtail (*Alopecurus geniculatus*)	,,	2 ,,
23.	Hawkweed (*Crepis capillaris*)	,,	2 ,,
24.	Spurrey (*Spergula arvensis*)	,,	2 ,,
25.	Barley-grass (*Hordeum murinum*)	,,	2 ,,
26.	Prickly sowthistle (*Sonchus asper*)	,,	1 ,,
27.	Cranesbill (*Geranium dissectum*)	,,	1 ,,
28.	Soft-leaved cranesbill (*Geranium molle*)	,,	1 ,,
29.	Smartweed (*Polygonum persicaria*)	,,	1 ,,
30.	Cheat (*Bromus secalinus*)	,,	1 ,,
31.	Spear thistle (*Carduus lanceolatus*)	,,	1 ,,

The percentage by numbers of extraneous seeds in New Zealand rye-grass that has been thoroughly machine-dressed is small and rarely exceeds more than 2 per cent., while in the great majority of cases it is considerably less than 1 per cent.

There appear to be no reliable source-indicators in the impurities found regularly in New Zealand rye-grass. Goose-grass, hair-grass, sorrel, which are the commonest impurities in local rye-grass, are also frequent in European samples. Probably the presence of Suckling clover and catsear may be taken as indicative of a New Zealand origin. Australian linseed, small-flowered buttercup, and cranesbill are also more or less indicative of North Island seed.

THIS SEASON'S SOUTHDOWN LAMBS AT RUAKURA FARM OF INSTRUCTION.

Photograph taken on 30th August, 1912.

LUCERNE-TESTING.

FURTHER EXPERIMENTS TO BE ENCOURAGED.

IN order to encourage the cultivation of lucerne, and to test this valuable forage plant under varying conditions of soil and climate throughout the Dominion, the Department will continue this season to supply a limited number of parcels of seed, lime, and inoculated soil (for the planting of 1 acre) to farmers desirous of trying lucerne on their properties.

On application to the Director of the Fields and Experimental Farms Division, Department of Agriculture, Wellington (a model application form is given below), there will be supplied at a railway-station or shipping-port which may be convenient to the Department 12 lb. of lucerne-seed, 750 lb. of lime, and 150 lb. of soil from an established lucerne-field. The cost to the farmer will be the railage or freight, and carriage to his own farm. He will be required to use this seed, lime, and soil on well-prepared land on the plan as shown, and to report the result:—

1 ACRE.

¼ acre. No lime; no soil-inoculation.	¼ acre. Lime, 375 lb.
¼ acre. Soil-inoculation, 75 lb.	¼ acre. Lime, 375 lb. Soil-inoculation, 75 lb.

To obtain the best results the land should be of fair quality, in a high state of fertility; the subsoil open, the drainage good, and the cultivation calculated to free the land of weeds. The seed-bed should be firm and well worked. The lime should be evenly distributed. The soil for inoculation should be broadcasted immediately before sowing the lucerne-seed; it should be harrowed and rolled. After the work is completed a plough-furrow should be drawn around the outer sides of the plot and along the lines dividing the acre into quarters.

A careful record should be made of the date of sowing the seed, also of its first appearance. The divisions of the acre, "No treatment," "Limed," "Soil-inoculated," and "Limed and soil-inoculated," should be noted.

The Director of Fields and Experimental Farms, Department of Agriculture, Industries, and Commerce, Wellington.

I DESIRE to test one acre of land for lucerne, and will make the experiment according to the proposal set out in the *Journal of Agriculture* of September, 1912. The seed (12 lb.), lime (750 lb.), and the soil (150 lb.), should be forwarded by rail (or steamer) to.....station (or port), or (if not directly to the experimenter) to Mr....., my agent at.....

I agree to pay all charges of transport from the railway-station (or port) from which the seed, lime, and soil may be consigned.

[*Name.*]
[*Postal address.*]
[*Date.*]

There are 555 co-operative dairies at work in Hungary. The State grants them subsidies on condition that the skimmed milk is previously boiled so as to prevent the spread of disease due to the germs that it might contain.

The Russian Prince Alexander Scherbatoff is urging his numerous friends to start a stud-book for the Arab strain of horseflesh. One section of the book is to be confined to purebreds, and the other to animals of proven desert blood in Syria, Egypt, Algeria, Turkey, &c. The idea is to hold shows at Cairo, and start breeding studs in the Khedive's territory.

CO-OPERATIVE EXPERIMENTS.

THE Department co-operates with farmers who desire to carry out crop experiments—both variety and manurial—on their farms.

The Department will supply the seed and manure, and will design and supervise the experiments; while the farmer provides the land and labour, and retains the crop.

The area of each plot is usually limited to from one-tenth to one-fifth of an acre.

Further information can be obtained from—

THE DIRECTOR OF FIELDS AND EXPERIMENTAL FARMS,
DEPT. OF AGRICULTURE, COMMERCE, AND TOURISTS.
WELLINGTON.

A FORM OF RED-WATER IN CATTLE.

DUE TO IMPROPER DIET.

J. G. CLAYTON, M.R.C.V.S.

THERE are two forms of disease in which the passing of blood or its broken-down constituents in the urine is a marked symptom, and both on that account are commonly termed "red-water." The most serious of the two affections fortunately does not exist in New Zealand. This is the one termed "Texas fever" in North America, "Rhodesian red-water" and "East Coast fever" in South Africa, "tick fever" in Queensland, and "tristezza" in Argentina. This disease is due to the presence of a parasite in the blood, and the disease is carried from one animal to another by the agency of certain species of the tick family. These particular ticks are not found in New Zealand, and their introduction is strictly guarded against by prohibiting the importation of animals from countries where they are known to exist. The so-called dog-tick, or castor-bean tick (*Ixodes ricinus*) is found in New Zealand, and this parasite has in European countries been credited with ability to act as a conveyer of tick-fever contagion from animal to animal when that disease has become established in a country. This tick, however, is common throughout the world, and its existence must not be regarded as in any way indicating any danger of tick fever occurring here any more than the presence of mosquitoes in New Zealand can be regarded as constituting a danger of malarial fever occurring in man in this country. It is a proved fact that the blood-parasite causing malarial fever is conveyed from man to man by certain varieties of mosquitoes in countries where the disease is established.

The misnamed "tick" commonly found on sheep must not be confounded with these true ticks. Our so-called sheep-tick is not a tick at all, but a wingless fly or louse, popularly known as a "ked" (*Melophagus*), and, apart from it being a nuisance to sheep, has never been known to be a carrier of any specific disease-germs.

The so-called red-water in this country is a dietetic and parturient condition, and is due to a disturbance of the digestive and assimilative processes, leading to an alteration or depravity of the constituents of the blood and their partial destruction. It occurs generally at a

certain period of the year, usually at the end of winter and the beginning of spring, and if cases are taken in time they generally recover quickly. It is frequently seen when animals are feeding on poor low-lying pastures, but the majority of cases occur when cattle, especially pregnant cows, are fed almost wholly on turnips without either getting a run off, or receiving something in the way of dry food, such as oaten chaff, hay, &c. In these cases the animals are not getting a properly balanced diet, the nitrogenous portion being insufficient, and the result is derangement of the digestive and assimilative processes. The blood in consequence undergoes changes which render it unfit for the proper nourishment of the system, and excretion by the kidneys of some of its constituents takes place.

With regard to the cases that occur when cattle are feeding on turnips alone, it is stated that by far the most of them occur where the roots are grown upon poor land. What might be termed the parturient form is sometimes noticed a week or so prior to calving, but generally from eight to fourteen days afterwards. The extra drain upon the system owing to the production of milk probably accounts for these cases. The condition is often not noticed until the animal is too far gone for treatment to be successful. In this connection it should be noted that care must be taken not to mistake a case of septic metritis for one of so-called "red-water." In septic metritis the urine may be discoloured by discharges from the womb, which are of a dirty-brown and not of a red colour. This disease usually occurs within five to twenty days after calving.

When animals are feeding upon turnips a careful attendant should go regularly round the cattle in the early morning. On rising they generally urinate, and the condition, if present, is then observable. Diarrhœa is a noticeable symptom in the early stages, it being often followed by an obstinate constipation. If one animal is found affected in a herd others should be looked for, not because there is anything of a contagious nature about the condition, but owing to the fact that all the animals have had the same mismanagement. Regarding treatment, the main thing to do is to bring back the affected animal to its normal condition by judicious feeding and attention rather than by medicinal methods. The first thing to do, if the animal is on turnips, is to remove it to other pasture, and try and get it to take a feed of good hay or oaten chaff twice daily. If other cattle have been running with it, they should be given a change too. Foods of an albuminoid nature, such as linseed and oatmeal gruels, should be given. Milk in which from half a dozen to a dozen raw eggs have been beaten up should also be given twice a day as a drench. The animal should be made comfortable by rugging, and protected from inclement weather. It is a good practice to give a purgative, no

matter whether there is diarrhœa or not. For this purpose I recommend the administration of a pint and a half of raw linseed-oil, and it can do no harm to add half a wineglassful of oil of turpentine to it. This may be repeated if necessary about the third day. A drench should also be given twice a day, composed of carbonate of ammonia, ½ ounce; powdered nux vomica, 2 drachms; bicarbonate of soda and powdered ginger, each 1 ounce. Give in milk or thin oatmeal or linseed gruel. The appetite should be tempted by giving a little picked hay, &c., and, generally speaking, good nursing.

In Holland two co-operative associations produce clover-seeds. After being threshed the seeds are placed in sacks, which are sealed and sent to a place where the members pass judgment, and where the seeds are divided into four classes and sold only to agriculturists.

Sixty cases of fruit attractively and carefully packed are as many as an orchardist should expect from his employee. If, as frequently happens, this number is increased to eighty and one hundred packages, lower average prices are to be expected. An extra gain of 2s. a case on all fruit packed during the day is more than sufficient to pay the wages of the packer. This gain cannot be reasonably looked forward to when packers are allowed to put up as many as ninety and one hundred cases a day.—*Australasian.*

An August Scene at Ruakura Farm of Instruction.

THE HAY-STACKS AT WERAROA EXPERIMENTAL FARM.

Unique Types of Swedes, showing Growth developing from the Root Ends and Peculiar Malformations.

OFFICIAL REGISTER OF MERIT.

PROGRESS OF WORK OF TESTING PEDIGREE DAIRY STOCK AND HERD-TESTING.

THE establishment of semi-official testing of pedigree dairy stock, on the basis outlined in the *Journal* of last July, is being taken advantage of in a very gratifying manner. Already applications have been received by the Dairy-produce Division from owners in all the principal dairying districts of the Dominion. Holstein breeders have been the chief supporters of the scheme. The number of cows being entered for the semi-official test is much larger than was anticipated when this new movement was initiated in New Zealand, conclusive evidence that our breeders of purebred stock are fully alive to the importance of a pedigree of performance in the advancement of the milk-producing power of their stock, and that they were only waiting for the opportunity—now afforded by the Department—of securing a guaranteed record of the annual milk and butter-fat yields of their cows and heifers, thus being able to furnish clients with the chief information desired in the purchase of a dairy sire. It is probable that several hundred purebred Holstein cows will be officially tested this season, and it is expected that about the same number of Jerseys will also be entered for semi-official testing. Both the Holstein-Friesian Association and the Jersey Breeders' Association have adopted the scheme for the taking and recording of the semi-official tests submitted by the Dairy-produce Division of the Department.

While the movement for semi-official testing has been esta lished with every surety of success, the work of herd-testing is proceeding in a highly gratifying manner. It is being taken up with widespread enthusiasm in Taranaki. It presages well for the advancement of dairying that so many dairy-farmers in that province are so anxious to profit by the undoubted benefits of herd-testing that they are ready to establish co-operative testing associations at their own expense and under their own control.

Co-operative testing associations have already been formed this season in Kaitaia and Maungatapere (Auckland), and Midhirst, Stratford, Lepperton, Normanby, Kaupokonui, Manutahi, and Kakaramea (Taranaki). In addition to these, associations have been established at Woodville and Kairanga, and, in the South Island, at Tai Tapu.

These, together with associations at Whangarei (Auckland) and Stirling (Otago), are under the control of the Dairy-produce Division, as has been the case hitherto where the principle is being introduced to new districts.

A particularly pleasing feature of the movement has been the undoubted success attending the conduct of independent herd-testing associations at Thames Valley and at Eketahuna. Both associations are being continued this year with increased enthusiasm and increased support.

It is estimated that the records of from 25,000 to 30,000 cows will be compiled during the present season, and it can now be said that the cow-testing movement has been firmly established in the Dominion.

WERAROA DAIRY HERDS.

THE ANNUAL SALE OF MILK-RECORD YEARLINGS.

ON the 1st November the bull calves of the 1910–11 season from the Holstein and Shorthorn herds of the Weraroa Experimental Farm will be offered for sale by auction at the Palmerston North Show-grounds. The whole of the herds are being officially tested at stated intervals by an officer of the Dairy-produce Division of the Department. This provides an absolute check on the daily records taken by the farm management. The young bulls have been brought to maturity with every care, in order to ensure that first and vital essential of a dairy sire—a virile constitution. The young Holstein bulls are all registered in the first section of the herd-book of the Holstein-Friesian Association. The dams are Longbeach cows, except in two cases, where imported American cows are the mothers, and the two sires are of American breeding. They will be offered, as will the Shorthorn yearlings, with full information as to the annual milk-yields (taken daily), in some cases for several seasons, of their respective dams.

A number of pure-bred Holstein and Shorthorn dairy bulls, cows, and heifers will be offered after the yearling Holsteins. The records of the heifers, the cows, and the dams of the bulls will be furnished.

Among the Shorthorn dairy stock will be a number of purebred dairy Shorthorns of the noted strain developed on the Darbalara Estate, in New South Wales. The original stock was selected for the Depart-

ment by Mr. R. J. Guthrie, a well-known dairy-cattle judge of Australia. Three young bulls are to be offered. These bulls are not entered in the New Zealand Herd-book. It is understood, however, they are eligible for entry in the herd-book of the Shorthorn Dairy-cattle Association of New South Wales. The Department will endeavour to arrange for the due registration of them. This, however, cannot be guaranteed.

The other Shorthorns to be sold (yearling bulls and heifers) have been bred on the farm from pedigree English dairy Shorthorn bulls, out of selected Shorthorn cows bred in New Zealand. As with the other stock, the milking pedigree of the dams will be provided. The cows will be accompanied by their milking pedigrees.

A yearling Jersey bull, by Australian stock, will be also submitted.

The annual Australasian Conference of Fruitgrowers will be held this year at Sydney on the 22nd October.

SANITARY FEED-TROUGH.

THE feed-trough illustrated is a simple and effective means of eliminating the rubbish from horse-feed. It has a false bottom of perforated zinc, through which dust and any small extraneous matter in the feed is forced by the animal in the act of feeding. This rubbish may be taken away by lifting up the piece of wood running in a groove, which closes the front of the true bottom of the box. A lid is provided to the box to keep vermin from the feed. The photograph was taken at the Waerenga Experimental Farm.

THE CASEIN INDUSTRY.

MR. PEDERSEN'S REPORT ON HIS EUROPEAN INVESTIGATIONS.

Favourable Prospects.

By a late mail the Director of the Dairy-produce Division received from Mr. J. Pedersen—the officer of his staff sent to Europe to investigate the casein industry—a full report on his work on the Continent.

Good Prospects for Casein.

The outstanding fact disclosed by Mr. Pedersen's inquiry into the prospects for casein on the world markets is that while the demand for the raw material (skim-milk) is rapidly increasing for articles for human consumption—many patent casein foodstuffs as well as for skim-milk cheese—the uses for casein in the manufacturing world are rapidly multiplying. The former demand must not only serve to maintain the value of casein, but it must inevitably tend to make European manufacturers more dependent on outside sources of casein-supply.

A mere summary of Mr. Pedersen's report is here furnished. The full text will be issued in pamphlet form.

Increasing World Demand for Skim-milk.

It is only during the last ten years that the casein industry has developed. It had its origin in America and Germany. So rapid has been its development that in the last five years the output has increased by over 100 per cent. Germany utilizes all its skim-milk for food purposes, and now imports about 5,000 tons annually from Argentina, France, Italy, and Scandinavia. Three years ago Denmark commenced the making of casein, and has now three hundred factories in operation. Last year German merchants were paying as high as 84 marks per 100 kilos net at the factory in Denmark, equal to £42 a ton. This high price, however, can hardly be considered the true value. The chief reason for the extreme price then ruling was a very dry season in the Argentine, necessitating American manufacturers buying in Europe. At present the price in Europe is £31 per ton. The freight from Wellington to Hamburg is £2 a ton. This rather low price is brought about by

the large quantity of poor-quality casein on the market, a fact which has been used as a lever by buyers to force down the price of the good article. Quality plays a most important part in the trade, there being little or no demand for an inferior article; it is almost unsaleable. There is now very little poor-quality casein being manufactured in Europe. New Zealand dairy companies, with a proper knowledge of the best methods of preparation, fortified by the Government grading, should, thinks Mr. Pedersen, have no difficulty in supplying the high-quality article in demand. Buyers purchase strictly according to quality, and, with grading, the business would be greatly facilitated.

Expanding Use of Casein.

During the last few years the use of casein for manufacturing purposes has increased enormously. For instance, in German paper-mills the machinery has been altered so that only casein can be used in the varied processes of making the several papers for which casein is required. Everything points to the use of casein being on the increase. It is coming into use for artificial foods for human consumption, amongst others lactorin, which contains 78 per cent. of casein; and sanatogen, which contains 95 per cent. There is also plasmon, Higgins's Casein Food, and many others.

High Continental Value of Skim-milk.

The production of casein is likely to decrease in Europe in the future, Mr. Pedersen considers, for the reason that skim-milk is being used more and more as a food product, and therefore has a greater market value than it has in a country like New Zealand. Denmark alone uses 500,000,000 lb. of skim-milk annually for the making of skim-milk cheese. When the manufacture of casein was commenced about one-third of this skim-milk was converted into casein. A result of this has been to increase the price of skim-milk cheese, the manufacturer of which pays the farmer 1s. 3d. per 100 lb. of skim-milk. It is obvious that when the value of skim-milk cheese advances, less casein will be made, and this factor, Mr. Pedersen points out, will always have the effect of maintaining the value of casein on European markets.

Skim-milk Cheese a Factor in maintaining Value.

So strong has this tendency been of late that a number of Danish casein factories have turned their attention to the making of skim-milk cheese. Then, again, Germany is importing skim-milk for food purposes. Mr. Pedersen mentions that he visited one

factory in Hamburg which was purchasing large quantities of skim-milk at 2¼d. per gallon net. What is taking place in Denmark is also taking place in other European buttermaking countries.

After enlarging on the many uses for skim-milk in Europe, Mr. Pedersen goes on to state that taking everything into consideration the outlook for casein-manufacture in New Zealand appears to be good. Casein should become an important factor in connection with the dairying industry of the Dominion.

Mr. Pedersen's report also deals with the preparation of rennet casein, the demand for which by the manufacturer is considerable.

THE MOST-APPROVED SYSTEM UNPATENTED.

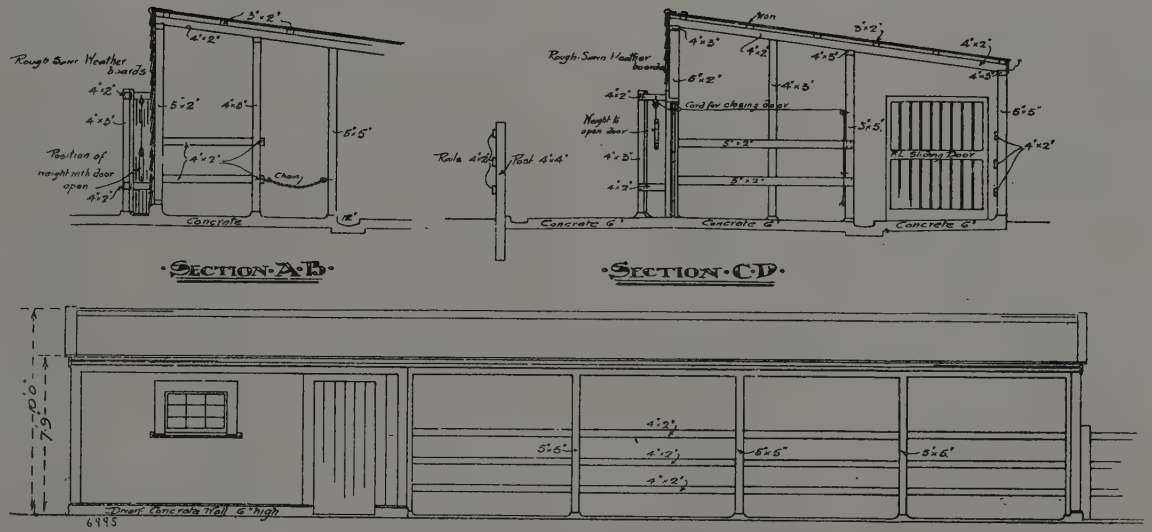
The method of casein preparation, reports Mr. Pedersen, now recognized as the most successful, is that known as the lactic-acid system. This is the discovery—a discovery which has not been patented—of Mr. O. Wennewold, a dairy expert in the employment of the Danish Government. Mr. Pedersen's method of investigation was the thorough one of actually working at the process in the leading centres of manufacture.

NEW ZEALAND SHOULD BE ABLE TO MAKE HIGHEST-GRADE PRODUCT.

The report goes thoroughly into the technicalities of casein-manufacture on the most approved principles. With this information at their command, and Mr. Pedersen's first-hand knowledge, gained from his practical experience in the best European factories, New Zealand dairy-factory managers should be able to make casein of the highest quality. Mr. Pedersen also furnishes a full description of the correct method of analysing casein, to determine its market-value, as well as complete details of the most up-to-date plant and drying factories, together with specifications and the cost.

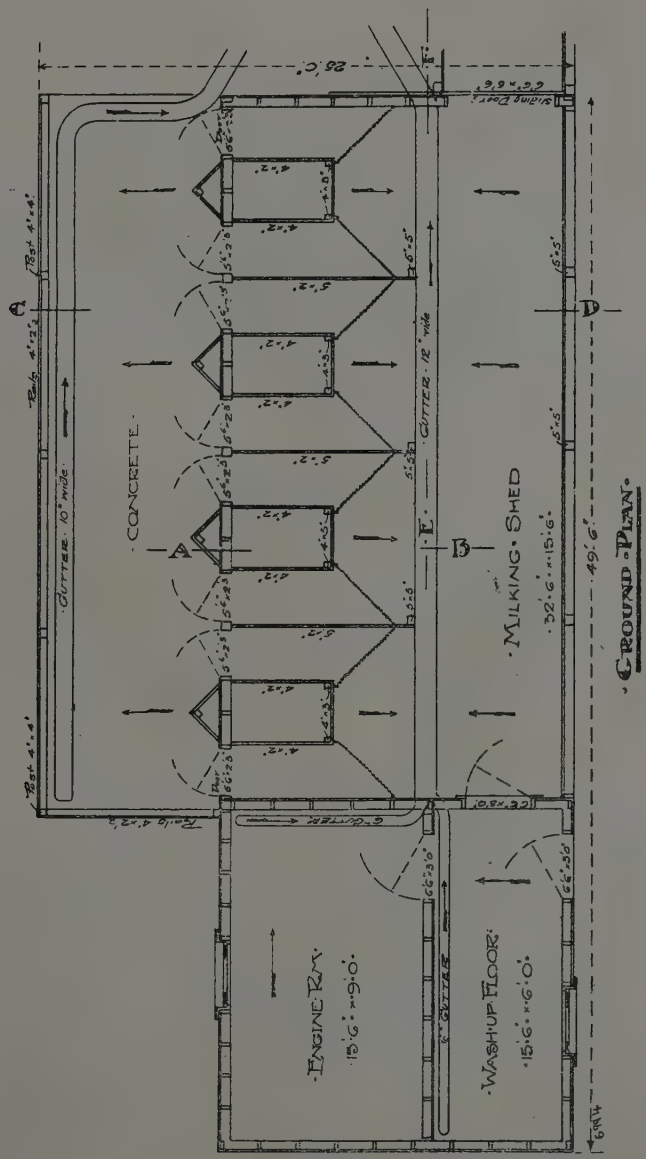
A quarter of an acre of white Belgian carrots at Motuihi Island, Auckland (the quarantine station) produced 50 tons. These were sold at the rate of £1 15s. a ton.

The cow-testing associations promoted by the Irish Board of Agriculture are making remarkable progress. It is now almost universally acknowledged, says the London *Dairy*, that many herds contain unprofitable beasts. The value of an animal cannot be ascertained by the "rule of thumb" methods formerly in vogue, and the example of the advanced farmers is having an excellent effect upon those who stood out against reform.



RUN THROUGH MILKING-SHED, RACE, AND YARDS.

Scale: 8 ft. to an inch.


CONCRETE
GUTTER 10" wide
GUTTER 12" wide
MILKING SHED
32'6" × 15'6"
ENGINE RM.
15'6" × 9'0"
WASHUP FLOOR
15'6" × 6'0"
49'6"
A
B
C
D
E
F

GROUND PLAN.

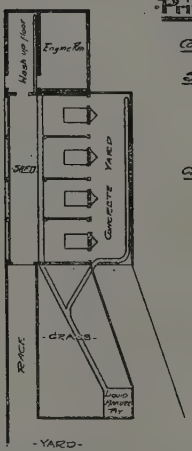
SECTION E.F.

Approximate Estimate of Principal Items

Concrete 26 yds

Sawn Timber.
Scantling 1900 ft
Boarding 1200 ft
Total 3100 ft

Galvanized Iron
25 sheets - 10'.0".
25 sheets - 8'.0".



BLOCK PLAN SHOWING POSITION OF YARD AND SHED ETC.
6996
SCALE 32 FEET TO AN INCH

THE HEMP INDUSTRY.

W. H. Ferris.

Diseased Leaf general.

Milling operations are now well under way. Although little export hemp has reached the grading-stores, the lines to hand indicate that, while the milling is being conducted in a careful manner, the quality of the leaf available from some swamps is not good enough for securing the highest grades. Diseased leaf is fairly general; and from reports to hand it would appear that millers will have considerable difficulty this season in securing any great quantity of the best raw material. This points to the necessity of very careful sorting if uniform lines are to be secured. In some cases it is probable the leaf will be so poor that it will not pay to sort, but will have to be treated for inferior grades.

Bleaching irregular.

The bleaching of some of the hemp to hand has been very irregular. Several parcels have been of a very poor colour—green and slightly discoloured. This, of course, quite prevents the fibre reaching a "good-fair" grade. Of the fifteen hundred odd bales graded in Wellington last month fully 82 per cent. were "good-fair," an excellent percentage for the time of year.

Splendid Market Values.

The better tone in the market has encouraged many Southland millers to resume operations. Over thirty mills will be in operation in that district this season. Everything points to it being the busiest season Southland has experienced for some years. The Auckland District will probably have a similar experience. Generally the 1912–13 hemp season will be one of exceptional activity, and should present prices continue it must also prove a very prosperous one.

Fine Position of Tow.

The most interesting feature of the market is the remarkable price tow is realizing. This residual commodity has been quoted by cable at a price which but a few months ago was being paid for the better qualities of phormium. The grading of tow, and the consequent improvement in get-up and packing, has brought about this much better appreciation of it.

EXTRACTING PHORMIUM-FIBRE.

W. H. FERRIS.

A NEW idea of removing the vegetation from phormium-fibre is being perfected by the inventor, Mr. Claydon, of Woolston, Christchurch, and has been named the Claydon-Maude Scraper. It is constructed very much on the same lines as the ordinary stripper, but different in an all-important essential, in that it is a true scraping-machine rather than a beating one. Not only does it effectively scrape off the vegetable covering of the fibre without any traces of injury; but it can deal with much more fibre than the ordinary stripper, and this with considerably less power. The resultant fibre is in no way bruised, being a free continuous thread, while it is clean and unaffected by dye and gum, which the present process beats into the fibre. As a result of this clean scraping, there should not be the same time required to bleach the fibre as with the present method. A thorough washing will probably be all that will be required to ensure a good colour. Another advantage is that the work is reduced to a minimum. The patentee claims—and judging from the work done in several tests it is a fair estimate—that the machine will turn out 1 ton of fibre to 6 tons 1 cwt. of green leaf.

The above impressions were gained from witnessing trials conducted under distinctly crude conditions. As the effect was so good with a rough model, temporarily set up, the results under proper conditions should be very satisfactory.

The distinguishing feature between the Claydon-Maude Scraper and the stripper in vogue is that with the former the leaf is fed into and between two drums, on each of which blunt pieces of steel on end—$\frac{1}{4}$ in. thick and $\frac{1}{2}$ in. high, and set diagonally on the drums, as with a "stripper"—alternate with flat plates of steel, $2\frac{1}{2}$ in. wide and $\frac{1}{4}$ in. deep, laid in the same direction. Both sides of the blade are scraped at the same time, the upright piece of steel on the one drum striking the flat piece on the other, and *vice versa*. In testing the machine I fed in from eight to thirteen blades at the one time, and even with the latter quantity the effect was good. There was no bruising, though some "ribs" were in evidence, owing to no "ribber" being provided in the machine. This with very poor power—an old 8 h.p. engine carrying 50 lb. of steam, and drawing direct from its fly-wheel to the pulley of the stripper with an old 4 in. belt. A proper test of a well-built model of the machine is being made under practical conditions.

THE APIARY.

NOTES FOR OCTOBER.

F. A. Jacobsen.

Necessity for Queen-rearing.

Perhaps the most essential point in the production of large crops of honey from individual colonies is to have young vigorous queens. A beekeepers' problem is not so much how to rear queens, but how to look after them from the time the cells are capped until they are mated and introduced to the hive. It is easy for those who are keeping only a few hives for pleasure, and who do not look to their bees as a source of revenue, for then time is not taken into consideration. The old queen may be killed and a capped cell introduced to the colony; but this entails much loss and means the hive would be without a laying-mother for some considerable period. This method does not meet with the large beekeepers' approval, whose ambition is to economize in time as much as possible. Ways and means adopted by him must be on sound commercial lines, and proved to be efficient in every respect. Firstly, then, I will outline a few of the popular styles of queen-rearing.

The Swarthmore System.

Assuming you have plenty of strong colonies in the apiary from which bees may be drawn, proceed in the following manner. Prepare a swarm-box with two frames of comb, one containing a quantity of fresh water that has previously been sprinkled into the cells, and one with an abundance of new honey and fresh pollen. Place these combs a little distance apart, and carry the box to a strong stock which has a queen-excluder over the brood-chamber. With as little smoke as possible open this hive and proceed to shake four combs of bees into the box, placing the fifth comb in with bees attached. Now quickly put the lid on and carry to the honey-house or some cool spot. The operations should take place about 10 o'clock on a fine morning. Before closing the old hive place a cell-bar holding-frame in the centre of the super, and put over the frames a cloth split in halves, to allow the said holding-frame being readily removed without disturbing the colony. Next place over the whole an empty honey super, and lay blankets or other warm material in same for the time being.

The usual work of the apiary may now be carried on for the space of six hours, after which time, about 4 o'clock, remove a comb of young brood from your breeding-hive. An empty comb placed in this hive four days before will be just right for the purpose. The young larvæ are now transferred from the comb to the artificial cell-cups in the swarming-box. When all the cups are grafted, wrap over the cell-cups and the sides with blankets, to preserve the warmth, and at the same time darken the room as much as possible. Leave them in this condition overnight.

Early next morning go to the colony from which you borrowed the bees and lift all but the brood-chamber on to a new stand. Now shift the brood-chamber with the bottom board to a distant part of the apiary, and place the super containing the queenless bees on to the old stand. Later in the morning the swarm-box may be brought out from the honey-house and placed in front of the old stand now occupied by the super, and proceedings may be taken to open the hive and roll back the quilts. It is advisable not to shake the bees in the swarming-box, but remove as quickly as possible the cell-bars, and place in the holding-frame in the hive. Put on the cover after replacing the quilts, and shake all the remaining bees from the swarming-box in front of the hive. These will soon run in and continue work on the cells, and field bees from the brood-chamber will fly to the old stand filled with honey.

Under these conditions fine big cells are produced. After three or four days have elapsed the brood-chamber may be removed to its former position.

The above method is adopted by a large number of beekeepers in all parts of the world. Included in these are Mr. Doolittle and Mr. Alexander, and the reputation of both these gentlemen in the beekeeping world leaves no room for doubt as to the efficiency of this method.

THE ALLEY SYSTEM.

A simple, efficient, and easy plan for raising numerous queen-cells may be found by using the alley plan. It must be understood, however, that when raising queen-cells they require to be large and well-shaped, and that any cells not up to size should be cut out. Procure a frame of young larvæ from your breeding-hive, and with a sharp knife proceed to cut every second row of cells down to the midrib of the foundation. Next kill two out of every three larvæ, and cut the comb into strips about 1 in. wide the full length of the frame. These strips are fastened with melted wax to cell-bars that hang about midway in a standard frame. The cells are pared down to about $\frac{3}{8}$ in. in height, which gives the bees room to construct a

Transferring Larvæ to Cell-cups.

Removing Started Cells from Swarming-box.

Placing Bar of Started Cells in Prepared Hive.

ARTIFICIAL QUEEN-REARING.

solid base for the queen-cell. The frame or frames containing these bars with the strips attached may now be put into the hive previously prepared for their reception.

Another way is to cut every second row of cells down to the midrib, leaving the foundation whole and in the frame. By placing an empty frame flat above the combs of the prepared hive the comb of larvæ could be placed resting on top of this with the cells intended for queens pointing downwards. Put plenty of warm packing over this, and then the cover, and if everything has been done properly a fine batch of queen-cells will surely result.

There are many other methods of queen-rearing that I have not space in this article to outline, but either one or the other mentioned would apply to almost any circumstances.

It remains now for the beekeeper to decide how best to look after the ripe queen-cells he has been responsible for creating, so I will outline one or more incubating-cages, and methods that have been practised and found suitable.

QUEEN-NURSERIES.

The advantages and perhaps disadvantages attaching to queen-nurseries may be discussed here in a few words. It is not certain that a queen-cell given to a colony will hatch out in a perfect condition. Her legs or other parts of her body may be imperfectly formed, or it is possible that her wings will be imperfectly developed. In this latter event she will always be unfertilized and worthless, and will waste the time of the colony in which she has been introduced. Sometimes it happens that the occupant of the cell is dead, and time is wasted in waiting for her to hatch out. This, of course, is avoided by having queens hatch in a nursery. A cell may sometimes be damaged and cut into before given to a colony, and will be destroyed by the bees on account of this; but if put into safe quarters will hatch out all right. A number of queen-cells may be on hand without any immediate use for them, and when put in a nursery they will hatch out and can be stored there for some time. Large batches of queens can be raised under this system, and either introduced as virgins direct to colonies or to nuclei for mating. About ten or twelve days in the nuclei in season will determine when she becomes fertile (by watching for eggs), after which follows a direct introduction into the colony she is picked to populate.

A theory is advanced by some that a nursery collects round it large quantities of bees and by this means the temperature in the immediate vicinity is considerably increased above the normal, to the detriment of the queens. It is said that this surely has some deleterious effect on those who later become hive mothers, but whether

this is so or otherwise cannot satisfactorily be proved. In the natural course the queen hatches out in the hive and is immediately surrounded by friends; but why should not the bees surrounding the nursery be friends as well? It is not to any advantage, however, to keep them imprisoned too long—say, more than a few days—in case fretting does take place.

The various styles of cages which are made to fit and combine into a nursery are all operated on the same principle. They may be made of wooden blocks or wholly constructed of wire, and of different sizes. They must fit smoothly yet tightly into a standard-size frame —say, twenty or thirty to a frame. The common style used in connection with cell-cups is to get a block of wood the size required according to how many are intended to go to a frame and bore a $1\frac{3}{4}$ in. or 2 in. hole right through the block. Then bore a $\frac{3}{8}$ in. hole through the bottom side of the block for the purpose of storing candy and connecting with the large one. Yet another one is bored at the top, of the same diameter as the cell-cup, and destined for receiving this latter, with queen-cell attached. Cover the two outsides with wire gauze, and you have a complete cage. Wire cages for cells cut direct from the comb, and for nursery-work, may be purchased from dealers in bee-requisites.

Beekeepers should delay as long as possible before putting cells in cages, and remove queens at the earliest convenience after hatching. The super-mating nuclei are excellent for holding queens over for any period, and are made as described in a previous issue of this *Journal* by dividing a super into three compartments. The time to requeen and receive the fullest advantage is early in the autumn.

In concluding these remarks it would not be out of place to add a splendid axiom by Swarthmore: "Change all failing or slow queens promptly, and breed from the best you can secure—thus raising the standard of your stock step by step, and improving the average year by year."

New Zealand Honey.—A shipment of New Zealand honey, comprising 201 cases, each containing two tins holding about 60 lb., recently arrived in London per s.s. "Turakina." On being opened up, after much delay caused by the dock strike, it was found to be in a messy and unsightly condition. The soldering was evidently faulty, as the joints had broken away and caused a great leakage of honey—some tins containing only a few pounds. The cases were scrubbed and cleaned, and those containing full tins realized 40s. per hundredweight. The quality of the honey was very satisfactory, being clear, and of good colour. The remainder of the honey in the damaged cases is being disposed of to the best advantage.—*High Commissioner's Report.*

ORCHARD WORK FOR OCTOBER.

W. A. BOUCHER.

ATTENTION has previously been directed to the necessity for keeping the soil in the orchard or garden free from any growth of grass and weeds. The winter rains being now over, and summer weather approaching, thorough working of the land should not be delayed. The soil in many of our orchard lands consists of a more or less stiff clay. Such soils should not be worked when they are wet, or left unworked until too dry. The period between winter and early summer affords an opportunity for cultivation that should not be missed, for if clay land is allowed to become too dry before it is turned over with the plough or spade it will remain in a rough condition, or full of clods, probably throughout the entire season.

SPRAYING.

Spraying for mussel scale and red spider, with the emulsified red oil at the winter strength, should have been carried out when the trees were dormant and buds closed. Instances occur where such treatment has been overlooked until too late, or unavoidably postponed. As a substitute when the buds have commenced to swell, the lime, salt, and sulphur mixture will be found effective for the control of mussel scale, and the kerosene emulsion when these insect pests are on the move.

FUNGUS DISEASES.

Apple-scab (*Fusicladium dendriticum*) and pear-scab (*Fusicladium pyrinum*)—frequently called black-spot of apple or pear—are always more or less troublesome. Persistent rains or frequent showers increase the difficulty of keeping these diseases under satisfactory control. Preventive treatment is by far the most satisfactory, and for this, so far, no remedy has been found that surpasses the Bordeaux mixture. Spray with the 10-10-40 formula when the buds show signs of swelling. Frequently further treatment will be necessary, for in spite of the check that fungus diseases receive from the effect of the application of the strong formula mentioned, scab will make its appearance after the fruit has set, especially in the case of some varieties of apples and pears, and particularly if showery weather or humid atmospheric conditions prevail. In such instances it will be necessary to spray with the Bordeaux mixture, 4-5-50 formula, as soon as possible after the fruit has set.

Apple-mildew (*Podosphaera leucotricha*) attacks some varieties of apples both in the nursery rows and in the orchard. This disease will be readily recognized by the fine whitish film that forms and spreads rapidly over the surfaces of the leaves. The effect is to cause the leaves to turn brown, wilt, and drop. Such defoliation causes young trees in the nursery to cease growing, while fruiting trees so attacked do not mature their crops. Every precaution should be taken to prevent this by adopting the same treatment as has been recommended for apple-scab.

Canker (*Nectria ditissima*): This fungus disease usually makes its appearance very early in the season. It can be easily recognized by the unhealthy discoloration of the bark and the ease with which it may be removed from the twig by the fingers; but in the case of attack during the previous season the bark will be found to be discoloured, hard, and shrivelled. In the latter case the best method of treatment will be to cut back to healthy wood all infected twigs or limbs before spraying with the Bordeaux mixture, winter formula. In the former cut back to healthy wood and spray with the Bordeaux mixture, summer formula. All diseased cuttings should be carefully gathered and burned.

Verrucosis, and grey scab (*Sporodesmium griseum*) of the lemon, can be satisfactorily kept under control by spraying with the Bordeaux mixture, 4-5-50 formula. This should be applied as soon as possible after the main crop has set.

CODLIN-MOTH.

Preparations should now be made to keep this pest under control. It is generally recognized that spraying with arsenate of lead offers the most effective means of doing so. Quite early in the season, especially in the warmer districts of the Dominion, the dormant grubs change to the pupa form and emerge from the cocoons as moths. They are not present in very large numbers, it is true, but quite sufficient to produce a fair percentage of infection if the necessary preventive measures are not adopted. These remarks apply to apples and especially to pears. In the case of pears the newly hatched grub almost invariably enters through the eye or calyx. On this account it is essentially necessary that the first spray should be applied as soon as possible after the fruit has set, so that the poison may enter the calyx before it closes, and remain there to protect the fruit from infection throughout the season. To delay spraying with the arsenate of lead until the calyx has closed will probably involve a loss of at least 50 per cent. of the crop, in spite of any effort that may be made later to control infection satisfactorily. To economize labour and expense the arsenate should be added to the Bordeaux mixture,

1-5-50 formula, for the first, and possibly second, spraying after the fruit has set, thus protecting the fruit against infection by codlin moth, apple or pear scab.

Several brands of arsenate of lead are now being offered to growers, who are advised to select one of recognized value. Some brands have been proved to be effective without being harmful, others not only ineffective, being deficient in killing-power, but decidedly injurious owing to the degree of scorching or burning of the foliage which has followed their application.

WOOLLY APHIS.

For the control of this pest the treatment outlined by Mr. W. H. Taylor is recommended. The formula is—1 gallon red oil, 1 lb. soft soap, ½ gallon water. Boil the water, add the soap, mix thoroughly, and pour in the oil. Put both suction and delivery ends of a spray-pump hose into the mixture, and work the pump steadily for a few minutes. This will give a perfect emulsion without any free oil. Paint any colonies of aphis noticed with the emulsion undiluted.

ANTHRACNOSE OF THE GRAPE-VINE.

Outdoor vines, especially in northern districts, are often severely attacked and injured by this fungus, which causes serious damage to cane-growth, foliage, bunches when in bloom, and berries when formed. Spray the vines thoroughly with the Bordeaux mixture, 10-10-40 formula, when the buds have commenced to swell. Vines of American are less subject to attack than those of European origin.

STRAWBERRIES.

The leaf-spot fungus (*Sphaerella frugariae*) is frequently troublesome in spring and early summer. In order to avoid staining the fruit the bisulphide of lime may be used as a substitute for the Bordeaux mixture.

DEMONSTRATIONS IN PRUNING AND SPRAYING.

DURING the month of August demonstrations in pruning and spraying were given at the following places by the Orchard Instructors:—

T. E. Rodda: Morrinsville, Waihou, Hamilton.

W. C. Hyde: Manutahi, Marton.

George Stratford: Alfredton, Otaki, Levin, Shannon, Weraroa (Boys' Training-farm), Pahiatua, Tane, Lansdowne, Woodville, Pongaroa.

J. A. Campbell: Norsewood, Raumati, Dannevirke, Havelock North (Arataki Farm), Hastings, Mahora.

E. A. Reid: Rakaia.

W. J. Courtier: Hokitika, Reefton, Christchurch, Southbridge, Flemington, Ataahua.

W. T. Goodwin: Earnscleugh.

THE FARM GARDEN.

W. H. Taylor.

Vegetable-growing.

To maintain a continuous supply of good vegetables a vigorous policy is necessary. The old adage about procrastination is particularly applicable to the pursuit of gardening, where the success of everything depends on doing whatever is wanted in the very nick of time. "Do it now," should be the motto; there should be no putting off till to-morrow what ought to be done to-day. A delay of one day may bring weather-changes resulting in the loss of a week. This may mean a break in the supply, or increased labour in thinning. It may be as wasteful to sow too early as it is to sow too late; there is a time when it is best to do everything. My endeavour is to indicate the best time and manner, having in view the importance of securing good results with a minimum of labour. As illustrations of my meaning I will mention three important vegetables—viz., celery, parsnips, leeks.

To most people *celery* is associated with a good deal of frame and box work; this involves a lot of work. If celery is required early the box work cannot be avoided. But most of the readers of these articles require celery in late autumn and winter; or, putting it another way, while there is a supply of tomatoes, cucumbers, lettuces, and suchlike, there is no real need for celery, which will be the more appreciated if it fills the want caused by the cessation of other supplies. The best celery is afforded by the winter crops, not the early ones. To secure good winter crop sow the seed in the open ground about the middle of September. The soil should be rich, and the seed not sown too thickly. When of a fair size, lift the plants with a fork, so as not to break the roots. Transplant into beds of rich soil, and leave the plants about 5 in. apart. They remain there till they strengthen into strong and sturdy plants; then plant in trenches in the ordinary way. This plan is the one followed by most experienced gardeners; it gives good results, and to the novice it avoids the somewhat difficult box work, which frequently leads to failure.

Parsnips are not of real service till summer crops are gone, they are at their best in winter, when the soil is cold; if taken into use too early they are liable to pall the taste. If sown early in November,

they are ready for use, and of good size, by May, quite early enough, as it gives them a currency of five months.

Leeks are frequently sown too early. Their place is as a winter vegetable; sown too early, they are liable to go to seed. Seed sown on the 15th September and transplanted the last week in December on good land, but manured only with superphosphate and bonemeal, gave us in June leeks which, when trimmed ready for the pot, in many cases weighed nearly 2 lb.

An Explanation.—A writer of articles of this kind is faced with a difficulty which it may be advisable to explain. To maintain a supply of vegetables certain seeds require to be sown at stated times; if this is done in an intelligent manner one crop dovetails into another, making a complete whole. It is my endeavour to indicate this, and if advice given in these articles is followed, most wants will be met. But many of the crops dealt with may be sown at times other than those indicated, when the exigencies of certain cases might render it advisable; but to mention these extended times each month would either lead to confusion or involve a large amount of printing. I therefore confine myself to outlining a policy which will be a sure guide to any one who follows it month by month, though leaving something wanting to the casual reader.

Peas should be sown about twice a month. The best plan is to sow again as soon as those last sown are well through the ground. But it should be distinctly understood that this rule will ensure a continuity of supply only if varieties of the same character are sown each time; for whereas a dwarf will come into use in about ninety-three to ninety-five days, second-earlies will take at least ten days longer, and main-crop varieties about three weeks longer. This should be kept in mind, as, if a dwarf variety was sown last, a taller sort will not come into use when the dwarf is past unless it was sown at the same time; therefore, if that has happened, the best way now is to sow more dwarfs and a taller sort at the same time.

Broccoli-seed should be put in at once. Broccoli should always be given a place of importance in the scheme of the garden operations, for it is broccoli that supplies the so-called "cauliflowers" throughout winter and early spring, from June to December in fact; there are no cauliflowers obtainable from June till November. A number of different varieties should be sown, including early, midwinter, and late sorts. It is best to plant more than the estimated number required, for it is utterly impossible to calculate exactly when they will come in: a number may come at once; hence, unless there is a sure surplus, there is certain to be a deficiency. I suppose no one can explain why it is that, when a batch of cauliflower or broccoli plants, all

of one kind, and all in every way alike, are put out at the same time, they do not all button together, but a batch of a hundred plants may actually be in cut for a couple of months. This matter of uncertainty cannot be controlled, but it should be considered in the planting arrangements; you must provide for a few to go to waste occasionally, or your supply must of certainty be short.

Cauliflower-seed should be sown now, some such variety as Veitch's Autumn Giant; the early kinds are quite useless for summer work. The cauliflowers, if the plants are well looked after, should be in use at Easter time, just as the pea-supply has slackened off: they are specially valuable at that time.

Brussels sprouts seed should be sown at once. This is perhaps the best of all winter vegetables, if well grown; but they are better left alone unless they can be given the ideal conditions; for unless grown straight on without any check they are not likely to be of much use. It is a mistake to leave plants of Brussels sprouts, broccoli, or cauliflower to grow in the seed-bed till they are large enough to plant out. It will answer all right sometimes, particularly in a rainy season, but as a rule the plants require better treatment, to fortify them against dry weather and other troubles. As soon as they can be handled the plants should be pricked off into beds of rich soil. Put them 2 in. or 5 in. apart; they then make strong dwarf plants, with plenty of roots.

Lettuce-seed should be sown about every six weeks during summer. A small bed only should be planted each time, for they soon loose quality in hot weather; even if there is no tendency to bolt, they soon acquire a bitterness that is not palatable. I find it an advantage to use a marker when planting lettuces, just the same as is used to make drills for seed-sowing. The marker is a piece of 3 by 2 scantling with four wooden teeth each 12 in. apart, with a handle like a rake. Passed lightly over the surface, the marker makes drills fit for all small seeds; a little pressure, and it makes deeper drills. In these drills I plant my lettuces; this puts the roots down below the dry surface soil, and obviates the necessity of watering.

Radish-seed should be sown nearly every week, only a little at a time, and very thinly; this being more important when long-rooted varieties are sown than it is with turnip-rooted sorts.

Onions will in most cases be ready for thinning, and there should be no delay about it; for a great deal depends on a good start, and this they do not get if crowded. If it is desired, the plants taken out can be transplanted, provided they are lifted without damaging the roots. The best and quickest way to transplant is to draw drills with the marker. Lay the roots of each plant against one wall of

the drill, and push the other wall of the drill against them; the plants need not stand upright. It is important not to bury any more of the stem than can be helped, and this need not be done if the plants are left lying almost or even quite on the ground; they soon lift themselves when the roots get hold.

Asparagus may be planted now in the way previously described.

French beans may be sown early in October in Wellington Province, earlier or later in different parts of the Dominion, and even in various localities in the same province, according to comparative warmth of soil and liability to frost; in any case it is useless to sow until a certain warmth of soil is assured; better be a little late sowing than too early.

Runner beans may be sown at the same time; they require deep and good soil. It is obvious that a plant that makes so strong and succulent a growth as these beans do must require a considerable amount of moisture; soil should be worked deeply, so that the roots can get down after it. The best crops I have ever grown were obtained when I planted the beans in trenches prepared as for celery. A good spit deep was thrown out, then a good coat of fat stable manure dug in the bottom; half the soil taken out was then returned, and the beans sown on that surface; they would thus be about 6 in. below the normal surface. When the beans had grown a bit the sticks were put in; these were put down in the trench, on each side; then the remaining soil was returned, filling the trench up level. This helped to hold the stick firm, and moulded up the beans; but, as the soil was left level, rain had easy access, and the roots, being well down, seldom suffered from drought.

Raising Plants in Boxes.

Most people who do any gardening require to raise some plants in boxes—celery, tomatoes, or flowering-plants such as asters, &c. Only here and there some are really successful in full measure. Soil for boxes should always be fairly rich; a good proportion of old manure is usually desirable, good loam should preponderate, and a little sand to keep it open and yet firm is wanted. Sometimes a little burnt earth, &c., from a rubbish fire is a good addition, particularly if the loam is not too good; a 6 in. potful of bonemeal to each barrow-load of compost, and a little—very little—soot is always good. The compost should not be riddled too fine, but some fine stuff is desirable to top off with in case of small seedlings. The boxes should be about 4 in. deep and of a size that will allow of their being easily lifted when filled with soil. It is seldom necessary to bore holes for drainage, but this should be done if the bottom boards fit close. The

box should first be more than half-filled with stable manure in a half-rotten state, so that there is still plenty of straw in it; press this down firmly. Now put in the soil, filling the box more than full. With a stout lath or strip of board longer than the width of the box stroke off the surplus soil, so as to leave it level with the top of the box; press it down a bit so as to make it firm; a piece of dry board is as good as anything to do it with. Now, with a slip of wood, $\frac{1}{4}$ in. thick and just as long as the inside width of the box, make lines by pressing its edge into the soil where the seedlings are to go. Orange-cases cut in half are often used; these will hold about eight rows of tomato or celery plants, six plants in each row. It may appear that the stable manure would be too strong for the plants; so it would be but for the fact that the necessary watering weakens it, and by the time it is reached by the roots it is just right for them. It answers two purposes, providing ample drainage while the plants are small, and stronger food when the plants are larger. Plants well raised should take such complete possession of the manure and soil about it as so to fill it with roots that when taken from the boxes to plant out they should completely empty the box; this consummation, however, largely depends on general treatment being right.

Flower-culture.

In some favoured districts or localities most of the half-hardy annuals can be successfully grown entirely in the open ground. In such cases it is imperative that they be not sown till a high temperature is assured. In most places it is found necessary, or at least best, to raise the plants under glass, frames being usually employed. Where this is being done the plants will in most cases be now ready for pricking off; this may be done in boxes prepared as advised in the vegetable-culture portion of this article. After being pricked off the seedlings will require watering through a moderately fine rose; they will be in need of a little shade from bright sun till they get a new hold of the soil, and even after that it may be wanted on extra-hot days; employ scrim tacked on to laths rather than painting the glass, as the shade can then be given just as it is wanted. Plenty of ventilation should be given at all stages of growth during the daytime; but while the plants are small close the frames early in the evening, partly because nights are cold, and partly because the plants want forcing for a time. But when the plants get well on in growth the lights should be left a little open at night, and at that time ventilation should be given in the daytime in such a way as to cause air to pass right through the plants; this is best done by propping up the low end of the light. The next stage is to push the lights off during the day, thus exposing the plants to full sun-

shine; pull them up, but not close, at night. After a week or two of this treatment the boxes may be removed from the frame and placed in a sheltered position in the open air—sheltered, but not shaded. This is the kind of treatment that rears plants that will take all the soil in the boxes up with their roots.

Planting *dahlias* may now be undertaken. The mode of raising plants by various methods was described in the last issue of this *Journal*. If good-quality flowers are wanted, the number of main shoots should be restricted; one or two is sufficient; one is enough, two just as good; a larger number is more than enough. For ordinary garden decoration, and cut-flowers in particular, they need not be so restricted; as a matter of fact, clumps left in the ground and allowed to grow just as they come will furnish a very large number of flowers good for any purpose except the exhibition stage. Dahlias require good soil, not necessarily a lot of manure; that, however, is not likely to come amiss, and soil long cultivated must have it. A good plan is to dig a hole two spits deep; half fill it with manure, and fill up with soil: this is for use when planting on a mixed border. When in quarters by themselves the manure is more conveniently dug in over the entire patch; but if the supply is limited the same plan may be adopted. The remarks about reducing shoots refers to old tubers being replanted. Young tubers from last season's cuttings may be planted intact, unless there should be a desire to make as many plants as possible out of them; in that case the young tubers that offer the opportunity may be divided, for even with these small tubers one shoot will make a plant.

Chrysanthemums are best kept in the nurse-bed till towards the end of October; any new stock acquired should be kept in the nurse-bed also; in the meantime see to the proper preparation of the soil in which they are to be planted. Chrysanthemums, like dahlias, offer themselves to more than one treatment. As a general principle, it is best to give chrysanthemums quarters to themselves, as the surest way of securing good flowers; this is quite apart from the question of exhibition flowers, the production of which is an art. Old clumps left in a mixed border frequently give a large number of flowers, useful in their way; but the plant is a gross feeder, and good results require special provision. Soil should be well enriched with stable manure; wood-ashes are good also. Before planting give, if possible, a dressing of soot, enough to cover the ground; fork it in a week or two before putting out the plants. The Japanese section should be grown apart from the Chinese, or incurved, as they are called, for evidence seems to show that they require a poorer soil in which to make their growth. Having seen the methods of an expert grower of incurveds, their requirements seem to be: a poorer soil than required

by Japanese, so as to grow a plant with hard stems; then plenty of feeding in the later stages and up to the time the bud is ready to burst.

Carnations that were planted out this season will require no other care at present than keeping the surface soil loose. I believe it to be wrong to mulch with manure, or feed up with artificials, when the soil has not yet been filled with roots. I believe such treatment is largely responsible for attacks of greenfly; another cause is planting in a draughty position. On the other hand, however, carnations do not like a snug corner, but an open position in full sunshine, and abundance of air.

Camellias, *rhododendrons*, and *azaleas*, as they go out of flower, should be manured if they require it; and if they are growing strongly they may be deemed to require it. Manure should be given as a mulch after flowering; this is the time they make their growth and form the buds for the next crop of flowers; this, then, is the time to feed.

PEACH-TREE, "MAMIE ROSS."

Second year of planting, unpruned. To show the value of peaches as temporary filling-trees in new orchard at the Weraroa Experimental Farm. The weight of the crop was 30 lb.

THE POULTRY INDUSTRY.

OCTOBER WORK.

F. C. BROWN.

OCTOBER should see all chickens hatched if they are to have sufficient stamina to withstand the heat of summer and make satisfactory development by the time the dear-egg season arrives. It is a common experience that the late-hatched chick grows well for a time, and when the hot weather arrives it makes little or no development, and in consequence has always a stunted appearance. The loss in young stock is almost invariably with the late-hatched chicks. I cannot urge too strongly the necessity of feeding the young birds well and managing them with every care. See to it that their quarters are scrupulously clean, remembering in this connection that the most dangerous insect-life cannot be observed with the naked eye. I have seen birds dying like flies on a new plant which to the eye was decently clean. Shade is another matter which must not be neglected. It is the only hope for late-hatched stock, but is essential for birds of every age. Do not neglect to keep the drinking-vessels thoroughly clean and to shade the water. Grit should be supplied in abundance. In the first few months of the bird's life animal food should be sparely fed. Crushed oats are always a valuable addition to the diet at this age, and green food is of special benefit to growing stock. Confined quarters are not desirable for growing chicks. The object should be to keep them steadily growing and not force them to maturity—one of the most fatal blunders in the business. The overforced bird that comes to lay in a sensationally short time neither gives the weight of egg nor the yield for the season that the bird gives which comes to lay in, say, six months, and is then full of constitutional vigour. In addition to being a more satisfactory egg-producer this virile type of bird is also vastly superior for the breeding-pen.

THE DISAPPEARING BROODY.

The end of the correct incubating or hatching period is now at hand. To those who are hatching by artificial means the work has been straight sailing; but those who are depending on the natural means have experienced more trouble than ever before in securing sitting-hens. Even the heavier breeds which are ordinarily looked to for providing broodies at this time are failing the breeder, owing to the obvious fact that these breeds are being gradually improved

from an egg-laying viewpoint, and therefore are losing the setting desire. The present-day ideal is the production of non-sitting strains of the heavier breeds, and the more this is reached the harder it is to obtain sitting-hens, especially at the time they are most required —viz., August, September, and October. Naturally the men who are suffering most from this rather unfortunate but necessary phase in the evolution of a highly profitable type of general-purpose fowl are farmers, the men who are keeping as a side line from fifty to a hundred head of poultry and who are responsible for the bulk of the eggs and table-birds produced in the Dominion. The elimination of the broody propensity is a natural consequence in the development of the egg-yielding power of such useful breeds as the Orpington, Wyandotte, and Rock; and the position must be faced. If eggs in the most profitable season are to be produced, and the highest number of the most valuable market eggs are to be secured, we cannot have birds which will go broody just when they are required for the hatching of chicks. The one and only solution is the adoption of artificial methods by the farmer. There are few farms in the country where there is not a boy or a girl who, especially if encouraged by some incentive, such as a monetary interest in the result, could not undertake with the necessary enthusiasm the comparatively simple work of managing an incubator and a cool brooder. Modern methods—which alone in these days spell profit — demand some study and exactitude. Any intelligent boy or girl — and the children of the farmer are just as keen and observant as those bred in the city—can manage an incubator and brooder. These are, however, but primary essentials.

Better Business Methods demanded.

I would appeal to the farmer, or his wife, who is generally left to look after the too often despised poultry, to give more attention to the products of the poultry-yard, which work will, of course, be made more effective where the whole business is conducted on up-to-date lines. The chief weakness is allowing the birds to lay anywhere (just as they are allowed to roost as it pleases them) and to collect the eggs from the odd corners and fences when convenient, with the result that the freshness of the eggs can never be depended on, and "farmers' eggs" in consequence have become a doubtful article of commerce. I was informed by a large city pastrycook the other day that he was about to preserve 30,000 dozen eggs. These he had purchased at 8d. a dozen. They were farmers' eggs, and thus being doubtful he could not afford to pay a higher price for them. Where such eggs are being used each one has to be broken separately into a cup; and thus, apart from the loss by reason of occasional bad ones, the labour involved is considerable. Where reliable eggs are being used

any number can be broken direct into the mixture being prepared. Under the circumstances it would pay to give 1s. a dozen if the eggs can be depended upon. There are men specializing in egg-production who sell their preserved eggs at 1s. 3d. a dozen; but these eggs are collected every day, and their freshness can be guaranteed. These men produce only infertile eggs, and these are always of better keeping-quality.

I have generally found that the smaller the farmer the better the treatment the birds receive. These men have to look to smaller returns, and they have come to appreciate the fact that there is money in poultry when decently attended to, and that the income from poultry is a constant one.

The most successful man at poultry-keeping I know is not only scrupulously careful as to the freshness of his eggs, but he makes sure that no egg goes to market, or even into pickle, if it has a speck of dirt upon it. His returns amply justify this care. There are few farmers in the country, however, who appreciate the necessity of taking these measures in order to establish a name for supplying eggs of guaranteed freshness and quality. Their eggs are generally sent to the grocer in exchange for goods, and the grocer fixes the price. I realize that the farmer has little encouragement under his present system of marketing to improve his methods. What is required is some co-operative system of disposal, such as that successfully followed in other countries by co-operative dairy companies—admirable agencies, by the way, for collecting and marketing in an up-to-date manner the eggs of their milk-suppliers. The production of eggs in the dear season will generally bring payable returns; but the farmer wants not what the village storekeeper will offer, but what the city merchants will pay.

General-purpose Stock.

It is gratifying to know that the action of the Department in reducing the cost of sittings of their egg-laying types of the heavier breeds, in order to induce the farmer to breed general-purpose stock, is being appreciated. Since the announcement of this decision in the columns of the *Journal* the orders booked for such sittings by the several plants of the Department show a great increase on the orders booked in previous seasons. I can assure those who have decided to found flocks of these breeds that they will not regret their action. In the first place, the cockerels reared will pay to keep and market, and they will pay for proper feeding and attention. They should be fed well from the first, as they will only be profitable if marketed in good condition when from four to four and a half months old, especially in time for the Christmas trade. The best way of feeding them is to treat them in the same manner as the pullets. If allowed to grow beyond the cockerel

stage before marketing, the cost of bringing them to the desired adult age is too great. As soon as the sex can be determined the cockerels should be separated from the pullets. As it is practically impossible to fatten birds when on range, the cockerels should be placed in confinement—in a decent house with a run giving opportunity for limited exercise. On the great majority of farms an excellent material is at hand for putting on flesh—viz., skim-milk—especially now that this residual product is pasteurized, and there is consequently no risk of bovine tuberculosis being transmitted to the poultry. Skim-milk may be mixed with the morning mash as well as kept in small troughs maintained in a thoroughly clean condition. Contaminated feed is bad at all times, but especially in the case of poultry. Another excellent foodstuff, both for the laying-hen and the fattening cockerel, is lucerne; and now that our farmers are coming to realize that this great plant can be grown almost everywhere, providing a good seed-bed is prepared and the soil is limed, it should be soon in general cultivation. A patch of it should always be available for the flock. In America great and increasing use is made of lucerne-hay for poultry. The proportion for this purpose should not be high. This is chaffed, and then steamed and mixed with the morning mash. I have seen excellent lucerne-hay in this country. It is simply cured, if the rule is observed that it must be cut and cured before reaching full maturity, and then handled with care, in order to prevent the shedding of the leaves, a peculiarity of the clover family, and which lucerne is specially liable to. In skim-milk and lucerne the farmer has excellent materials for taking the place to a large extent of grain, pollard, and bran, the present high prices of which are so seriously reducing the profits from poultry. As a green food nothing is better than watercress. A very successful poultryman in the Wellington District uses this in large quantities. He finds that it not only keeps the fowls in good health and gives the desirable rich colour to the eggs, but assists materially in reducing the food bill. He chaffs the watercress and mixes it with the morning mash, while he also keeps it always before the birds in a cut-up form in special troughs.

Things to remember.

Don't breed from late-hatched pullets.

Not only is it cruel to keep fowls hungry, but it is unprofitable.

Disease is seldom found among fowls well housed and given proper food and attention.

Do not fall into the common error of thinking the poultry business can be mastered in a day.

As a general rule, the very-early-hatched pullet lays a few eggs in the late summer and early autumn, and then moults like the adult fowls during the dear-egg season.

CO-OPERATIVE EXPERIMENT RECORD.

THE PAST SEASON'S EXPERIMENTS.

NORTH ISLAND.

G. DE S. BAYLIS.

FROM an experiment point of view the past season has not been a very satisfactory one. The prevalent conditions have been distinctly abnormal, and therefore the issues resulting this season in most parts of the Dominion must be considered by themselves, and are not comparable with or indicative of the results probable in a normal season.

The high winds we usually experience in the spring-time generally seek occasional rest from their blustering exertions, then balmy days bringing the warmth and growth of spring fill in the pleasing intervals. This season the wind blew for weeks on end, and continual cold rains in many districts prevented the soil from ever becoming really warm, while the wind burned the tender foliage of young plants and broke the tender rootlets. The abundance of rain, however, suited such crops as oats and wheat and hardy forage crops; but the wind did much damage to autumn-sown wheats and oats, which flowered early in the season while the winds were at their height, many flowers not being fertilized in consequence, and many ears not being properly filled. Speaking generally, the man who sowed late, and whose crops consequently would have been a certain failure in an ordinary season, this season in many cases did very well.

There are, however, always compensations; and in such a season as we have experienced many of the blights and pests, which increase so rapidly under favourable conditions, must have received a considerable check.

MAIZE.

Maize crops have been disappointing this season. Crops sown in the southern parts of the North so late in the year that, in a normal season, success would have been impossible, this season made considerably more growth than the early crops. Few of those so sown, however, ever reached the most suitable stage for feeding, owing to the advent of frost. Indeed, many maize crops in the Wairarapa and other places were cut back by frost at least on two occasions during the summer. The fact that late sowings proved more successful than earlier sowings in the southern parts of the North Island, and that hardly any of them reached the proper stage for feeding before the advent of frost, again accentuates the need for the introduction of short-season varieties for the production of early summer feed in normal seasons, and for late sowings—viz., when it has become too late to sow varieties which take considerable time to reach maturity. It would seem possible that the Early Yellow Languedoc, grown by Mr. Potts at New Plymouth, and only imported late last season, may be one of the varieties suited to this purpose.

Experiments for the utilization of maize instead of rape for the purpose of weaning lambs were tried successfully last season as a substitute for rape.

Maize was also grown in conjunction with kale, and, considering the season, the results were encouraging, since the real object of this experiment is to select plants for seeding, and to harvest the kale-seed next season.

I have often advocated that, in lieu of importing so much maize-seed every year, we should obtain better results if we grew it in suitable localities in this

country. With regard to this, although the experiment was not designed for such a purpose, still it is interesting to note that the variety of maize which appears to have done about the best this season is Red Cob Ensilage, a variety the Department imported from the United States, and which imported seed was grown on the Northern Wairoa. The crop from the imported seed was weak, did not germinate too freely, and was rather suggestive of old seed; but selected seed therefrom grew 56 tons of green fodder for Mr. Lancaster at Fitzherbert, and did very well with Messrs. Allan and Campbell at Taradale, where it more than doubled the yield of maize of the ordinary variety. Is not this an argument in favour of importing good varieties and growing our seed in New Zealand?

Here is a more elaborate experiment, conducted on a scientific basis. The Transvaal Department one year tested side by side some thirty or forty varieties of maizes, consisting of about one hundred different samples, and approximately three samples of each—viz., (*a*) imported, (*b*) the same variety one year Transvaal-grown, (*c*) the same variety two years Transvaal-grown. In practically every case the Transvaal two-year acclimatized sample proved the most productive and the best quality.

To promote and facilitate the use of New-Zealand-grown maizes, our seed-merchants might each year arrange with growers in suitable districts to grow at least a portion of their requirements in maize on contract for them. In order to obtain good varieties they should themselves import and supply the seed, and in order to keep the varieties pure they should stipulate that no two varieties be grown within 500 yards of one another.

SILVER-BEET.

This promises to become a useful forage plant, and is decidedly worth exploiting. It requires more care and attention than does rape, and its use as a grazing-crop requires still further experiment. Mr. W. Arundell, of Patea, pulled the leaves three times between the 1st March and the 30th May, and obtained a yield at the rate of 79 tons 18 cwt. per acre.

LUCERNE.

Since the previous notes were taken considerable time has elapsed, and while some plots may have gone back somewhat in condition, many others that were not so good have taken a better hold. It would have hardly been possible to have picked a worse season for the sowing and establishing of lucerne-plots. It has been well described as "destitute of warmth, and prolific in weeds." The experiments with lucerne have proved, in spite of the season, that there are in New Zealand many soils capable of readily growing lucerne; that there are others which, by the aid of lime, fertilizers, proper cultivation, and probably inoculation, can be easily fitted to grow lucerne; while others, by heavy application of lime, subsoiling, fertilizing, cultivation, certainly inoculation, and probably green-manuring, can be made to grow this most invaluable of forage-plants. This gives a very extensive range of probable lucerne-areas.

Another thing that co-operative experiments have impressed on those willing to learn is something about the various methods necessary to employ in order to clean land of weed-seeds; and while many a one has first to fail in his attempts before he realizes the urgency of thorough methods, others quickly realize that without thorough cultivation the growing of heavy crops of anything, especially the establishing of any kind of crop at all of lucerne, is almost impossible.

In the lucerne-plots recently sown down I venture to prophesy that those who made effort to keep weeds in check during winter and early spring will in most cases be surprised by the consequent hay crops their somewhat (perhaps at this season of the year) indifferent-looking crop of lucerne will produce; while the man who places himself in the arm-chair, and his trust in Providence, will in most cases seek his lucerne in vain by next autumn.

OATS.

Co-operative experiments have been the means of introducing many useful varieties of oats into the Dominion. They have also formed the chief sources for further supply of these varieties. White Ligowo, Black Mogue, Beardless Prop-

steier, and Victory have all been brought from the famous seed-breeding station of Svalöf in Sweden.

In the Wairarapa both White Ligowo and Victory are very highly spoken of by experimenters. Mr. W. Cameron, of Te Ore Ore, grew 125¼ bushels per acre of White Ligowo, and on Messrs. Shaw and Sons' property 120 bushels was the yield obtained. Both these varieties are being largely sown this season.

Triumph oat, imported by the Department from England, is one of the strongest straw varieties existing, and is likely to prove very valuable for use in mixed forage crops. At the Marton Experimental Plots 15¾ tons of green fodder was cut last December of a combination of Triumph oats and vetches.

BARLEYS.

The chief barleys introduced for co-operative-experiment purposes are Hannchen and Swan-neck—both from Svalöf. They are likely to prove very useful forage varieties, having been well spoken of for this purpose by growers. Samples of these, which were grown at the Marton plots—probably not the best soil for barley—were sent to Messrs. James Speight and Co. (Limited), who very kindly undertook to report upon same. The report says, "We consider this a good second-class malting-barley, which we would have no hesitation in buying, but we would give the preference to Swan-neck. Both lines are very good barley; Swan-neck considerably the best. Owing to the thickness of the skin it lends itself to good threshing, therefore the percentage of broken grains is very low. The barley is similar to that known as Garston, but is not equal to the first-quality Blenheim, Canterbury, or Shotover grown."

It would perhaps be instructive from an experimenter's point of view to grow this variety in the districts named, and watch the influence of climate and soil upon the quality obtained.

WHEATS.

The following are wheats imported by the Department which have been introduced to the notice of the North Island growers through the means of co-operative experiments: Yandilla King, Federation, Comeback, John Brown, Power's Fife, Tarrogan, Jonathan; all from Australia. Grenadier and Swedish Pearl, from Sweden; both true winter varieties. Imperial Amber and Turkey Red, from Canada; both true winter varieties. Red Fife and White Fife, from Canada; both varieties said to do equally well spring or autumn sown.

Federation, a purple-straw variety, one of the first varieties to be introduced, is capable of standing erect in most soils and climates, yields well, and has become exceedingly popular in the Rangitikei district, where several considerable areas are now sown every year. Many of the other varieties are also highly spoken of. Grenadier from Svalöf has a beautifully built ear, and gave the heaviest yield at the Marton plots this season. It has a small and much harder grain than have the usual varieties grown in the north. Comeback, Jonathan, Power's Fife, have all come out exceedingly well in the milling tests, and the areas sown in these varieties are on the increase.

In the Marton trials Federation came second and Turkey Red third. With the exception of Imperial Amber, which is a bearded winter variety, the Canadian wheats are deceptive in the fact that from appearance in the field many other varieties, especially the bigger New-Zealand-grown varieties, have the appearance of yielding a heavier crop, which fact at Marton plots was not borne out after harvesting, since Turkey Red came third, Red Fife fourth, White Fife fifth, in the trial, which included eleven varieties of wheat.

The object in introducing these varieties has chiefly been to discover varieties suitable to the requirements of the different districts, which would produce grain of better milling-qualities than North Island wheats produce at present. Most of the varieties introduced produce far harder wheat than the present North Island varieties. The Canadian varieties were recommended for trial by Dr. Saunders, Dominion Cerealist, of Ottawa, Canada.

The Marton plots have been the chief trial ground and source of initial supply, and this season a fair number of acres of these new wheats will be sown in the Wairarapa, as well as in Rangitikei and other districts, the seed for which has been supplied from the trial plots at Marton Junction.

MANGELS.

Great difficulty was realized this season in obtaining a good take. The coldness of the soil and consequent slowness of growth rendered the young plant very liable to attack from leaf-eating insects. In some cases, in light gritty soil, the young plants were literally ringbarked by sand borne by the continual wind. In places some good crops have been obtained, but I should imagine that neither in size nor in yield have the mangel crops approached the average this season. In Taranaki the Sugar mangel appears to again merit the high opinion formed of it by experimenters during the past two seasons. The Jersey Queen, a new variety, is favourably mentioned by some who have tried it.

With regard to the growing of mangels, to ensure success on a large number of soils a fairly heavy dressing of manures is required. In New Zealand the farmer, owing to the fact that it saves labour, desires to sow the fertilizers through the drill at the same time as the seed. It is often remarked by observant farmers when experimenting with mangels that the best take is often found upon the "unmanured" plot. The reason often is that on soils where heavy dressings of fertilizers are needed in order to grow a really good crop of mangels, the roots, being very tender at the stage of germination, find the manures too strong for them. Now, this is not an argument against the use of manures, because a considerable dressing of fertilizers is, on the majority of soils, an absolute necessity in order to grow a good crop of mangels. It is, however, an argument against the improper use of fertilizers—viz., depositing all the fertilizer in one spot and trusting to Providence to mix it with the soil. It is, however, possible to obtain drills which will drill either on the ridge or on the flat, and will deposit a little manure with the seed, the balance below it ready for the roots when they are strong enough to make use of it. This is a better way to sow mangels.

Various other experiments have been carried out, dealing with refractory soils, top-dressings, and suchlike experiments, regarding which separate reports will be published later.

MISCELLANEOUS TRIALS.

Soya beans were sown on Dec. 16 by W. Pye, Redvale, Auckland, with 3 cwt. slag, 1 cwt. super., ½ cwt. wood ashes to the acre, the soil being portion of a drained flat on the gum lands. The beans did fairly well considering the unfavourable summer experienced, and podded and ripened seed satisfactorily. Soya beans were also sucessfully grown at the Avondale Asylum, Auckland. Mr. Muir planted ⅛ acre on Dec. 10, using 1 cwt. super. The beans grew about 18 in. high, averaging 98 to 100 pods on each stem. Soya beans were also grown by Mr. B. Chambers, Havelock North, and Mr. F. McRae, Palmerston North, but small success was obtained by them.

Rhodes grass was grown by Mr. W. Pye, Redvale, Auckland, upon the same class of soil as the Soya beans. It attained a height of 2 ft. or more, and a fair quantity of seed was obtained therefrom. It seemed to like the conditions under which it was growing, and to be throwing a very fair bulk of seed. The plot at present is too small for grazing purposes.

Natal Red Top was grown under the same conditions by the same grower, and a certain amount of seed was obtained. Both these grasses are sensitive to frost, and cannot therefore be looked to for winter feed.

Sweet Corn.—Three varieties of sweet corn were introduced from America by the Department last season: Black Mexican, a blue-black variety of a mealy flavour peculiar to this variety; Kendal's Early Giant, a white variety; Evergreen sweet corn, a crinkled-skin variety. The season was especially unfavourable for maizes of any description. At the Mental Asylum, Auckland, Mr. Muir reports that Kendal's Giant yielded about 35 bushels per acre, and Black Mexican about the same. Kendal's Early Giant was also grown at Palmerston, and the grower placed a limited number of the cobs on the market to test them. He reports that they sold readily. Sweet corns were also grown at Napier and New Plymouth, and a small supply of these varieties has been harvested from the seeds imported.

Description of Soil.	Variety of Crop.	Cultivation.	Seed sown.	Manures per Acre.	Harvested.	Yield per Acre.	Remarks.
PASTURE.							
Experimenter—H. Johns, Taranaki.							
Dark loam, 6 in. deep, on sandy subsoil	Temporary pasture. (Previous crop, mangels)	Ploughed Sept. 10; disced twice, rolled twice	Oct. 11. 20 lb. Italian rye, 20 lb. prairie-grass, 6 lb. red clover, 3 lb. lucerne	1½ cwt. super., ½ cwt. blood and bone, ½ cwt. sulph. amm., ½ cwt. kainit, ½ cwt. gypsum; total, 3½ cwt. Cost, 19s. 7d.			A temporary pasture grazed by cows. This mixture formed a very good pasture for dairy cows.
Experimenter—J. A. Symes, Riverlea, Taranaki.							
Sandy loam, 8 in. to 9 in., upon stiffer subsoil	Temporary pasture. (Previous crop, green oats)	Ploughed 6 in. Sept. 20; disced once, Sept. 29 and Oct. 2; disced once, harrowed twice, and rolled, Oct. 9	Oct. 11. 20 lb. prairie drilled through the coulters mixed with manure; rolled, then sowed broadcast, 20 lb. Italian rye, 3 lb. lucerne, 6 lb. red clover; then brush-harrowed and rolled	1 cwt. super., 1 cwt. blood and bone, 1 cwt. kainit. Cost, 15s.	Ready to feed, Jan...	..	Very slow growth at first, owing to cold winds; rapid growth later on. On portion of this plot the prairie seed was divided and one lot drilled one way and the other across it. The experimenter says, "Would strongly recommend cross-drilling prairie."
GRAIN.							
Experimenter—W. C. Miller, Masterton.							
Light stony black soil on stony yellow loam subsoil	Victory oats ..	Ploughed Sept. 5; harrowed twice, drilled, harrowed, and rolled	Sept. 7. 3 bushels	¾ cwt. super., ½ cwt. slag, ½ cwt. sulph. pot.; total, 1¾ cwt. Cost, 7s. 11d.	Feb. 6	53 bushels. Straw, 1 ton 9 cwt.	For green feed Mr. Miller recommends ploughing, cultivating, and sowing from 1st March to end of April, otherwise skimming and letting lie until end of July, then working up and ploughing about 6 in. deep, cultivating well, and sowing about end of September. The Victory oats averaged 5 ft.; Beardless Propsteier, 4 ft. 6 in.
Ditto	Beardless Propsteier oats	Skim-ploughed Aug. 15; ploughed 6 in. and harrowed twice, Sept. 5	Sept. 7. 3 bushels	1½ cwt. super., ½ cwt. sulph. pot.; total, 1¾ cwt. Cost, 10s.	,, 6	55 bushels. Straw, 1 ton 10 cwt.	No rust or smut were apparent, and they stood the wind well. The Beardless Propsteier oats were not too well filled, on account of late sowing.

NOTE.—Mr. W. J. Foster, Ballance: Experimenter with Triumph, White Ligowo, Victory, and Beardless Propsteier Oats: "The crops were sown too late, and, owing to a heavy storm, the crops were threshed before they were harvested." The varieties, however, did very well with him.

Experimenter—W. J. Birch, Marton.

Clay loam upon clay subsoil	White Fife wheat, following mangels	Ploughed 8 in. July 18; disced twice, harrowed twice, and drilled, July 22	July 22. 2½ bushels, without manure	Top-dressed with ⅜ cwt. slag, ¼ cwt. bonemeal, 1/15 cwt. sulph. pot., ⅓ cwt. blood, 1/10 cwt. gypsum; total, 1½ cwt. Cost, 7s. 5d.	Jan. 27	43 bushels ..	The quantity of seed sown was suitable. Feeding-off in spring this season would have done good. The crop was a very nice one, but perhaps would have been better if I had drilled the wheat with manure. I propose sowing about 16 acres next season.

Experimenter—J. R. Warriner, Greatford.

Clay loam upon stiff clay subsoil	Wheat—Comeback, Federation, and Turkey Red	Ploughed Sept., disced twice, harrowed twice, drilled, and harrowed	Sept. 3 bushels Comeback, 2½ bushels Federation, 2½ bushels Turkey Red	2 cwt. H. and D. mixture	.. ..	46½ bushels Comeback, 54 bushels Federation, 41 bushels Turkey Red	Previous crop was turnips, for which the land had been limed at the rate of 5 cwt. per acre. This applies to all plots. Both Comeback and Federation were good crops. Turkey Red suffered a good deal from the wind; this variety, however, did very well at Marton plots.

Experimenter—H. J. Fowler, Peach Grove, Marton.

Part of the paddock stony and light, balance strong loam; subsoil clay	Red Fife wheat. (Previous crop, wheat)	Skim-ploughed Feb. 23; ploughed in July, 8 in.; harrowed once before drilling, once after	Aug. 9. 2½ bushels	⅜ cwt. slag, ½ cwt. bonemeal, 1/15 cwt. sulph. pot., ¼ cwt. blood, ⅛ cwt. gypsum; total, 1½ cwt. Cost, 8s. 2d.	Feb. 10	40½ bushels ..	From 4 ft. to 5 ft. high; grain excellent quality. The straw of this wheat is the nicest I have seen, being of a beautiful colour and sheen, perfectly clean, and free from disease.

Experimenter—H. J. Bradley, Raupo, Northern Wairoa.

Black loam, 3 in., on river-mud	Federation wheat..	Ploughed in Aug. and well disced prior to sowing	Sept. 4. 2 bushels 40 lb.	1 cwt. super. Cost, 5s.	Jan. 24	..	Very good crop, and superior to White Marvel. The first crop of wheat I have seen grown in the district. Average height, 3 ft. 6 in.
Ditto	White Marvel wheat	Ditto	Ditto	Ditto	Feb. 10	..	I think Federation yielded a heavier crop and better grain. Average height, 3 ft. 6 in. to 4 ft.

NOTE RE COMEBACK WHEAT.—At Marton plots, where the drill failed to put the proper quantity out, only a very light crop was harvested. Mr. Warriner, who has, in conjunction with myself, grown this variety for some three years now, agrees with me that the best results would be obtained on most soils by sowing not less than 3 bushels per acre of this particular variety, which, owing to its nature of growth, needrs a moderately thick sowing to secure a heavy yield.

Description of Soil.	Variety of Crop.	Cultivation.	Seed sown.	Manures per Acre.	Harvested.	Yield per Acre.	Remarks.
			GRAIN CROPS—*continued.*				
			Experimenter—T. Gifford, Rongotea.				
Black loam, 8 in. deep, on clay subsoil	Swedish Pearl wheat. (Previous crop, oats)	Skim-ploughed Mar. 3; harrowed and re-ploughed May 30	June 3. 1½ bushels	None	Jan. 26 .. .	48 bushels ..	Height, 5 ft. 10 in. No rust; small signs of shelling; weather very rough when ripening.
Ditto	Marshall's White. (Previous crop, oats)	Ditto	Aug. 11. 2 bushels	,, ...	Feb. 5	61 bushels ..	Height, 4 ft. 6 in. Quality good, no rust, did not shell out, went down in places.
,, ...	Comeback. (Previous crop, oats)	,, ...	Aug. 11. Part 3 bushels, part 1½ bushels	,, ...	Jan. 31 .. .	52 bushels ..	Height, 3 ft. A very taking crop; short, stiff, bright straw. Mr. Gifford says that the portion sown with 1½ bushels yielded as well as that sown with 3 bushels. In the absence of definite records to prove this statement I doubt its being correct.
			ROOT CROPS.				
			Experimenter—W. Arundell, Patea.				
6 in. to 8 in. sandy loam on light yellow porous subsoil	Silver-beet (Swiss chard)	Ploughed July 5, 7 in. deep; harrowed Aug. 22; scuffled Aug. 29; harrowed Sept. 11 and 22, and cultivated to keep down weeds	Oct. 25. 5 lb.; thinned to 12 in. apart; in drills 32 in. apart	2 cwt. super., ½ cwt. sulph. pot., ½ cwt. sulph. amm.; total, 3 cwt. Cost, £1 6s. 10d.	Leaves pulled Mar. 10, May 2, May 28	53 tons 6 cwt., 16 tons 19 cwt., 9 tons 13 cwt.; total, 79 tons 18 cwt.	"The leaves were pulled off and fed to cows, which eat them greedily. Advise to sow in drills 18 in. apart about Sept. 15, and to cultivate between rows as long as possible."
			Experimenter—J. Steele, Towai, Bay of Islands.				
Clay loam upon a clay subsoil	Buda kale	Ploughed Oct. 17; disc-ploughed and harrowed Nov. 6. Made drills with plough, balance of work done by hand. Hoed weekly	Nov. 10. 8 lb. per acre in 14 in. drills	4 cwt. of mixture. Cost £1 4s. 4d.	Mar. and April ..	Not ascertained ..	"Large bundles were cut daily and fed to cows."
Ditto	Thousand-headed kale	Ditto	Ditto	Ditto	Ditto	Average height, 2 ft. 6 in.	Cut daily and fed to cows.
,, ...	Silver-beet ..	,, ...	,, ...	2 cwt. slag, 1 cwt. blood and bone, ¼ cwt. sulph. pot.; total, 3¼ cwt. Cost, £1 0s. 1d.	,, ...	..	Cut daily for cow-feed. Plants vigorous.
			Experimenter—A. Oliver, Ohangai, Hawera.				
Black sandy loam top, free sandy loam subsoil; old pasture	Mangels — Garton's Gatepost, Sutton's Yellow Intermediate, Sutton's Sugar	Ploughed June; disced Sept; Oct. harrowed thrice; ploughed Oct.; disced twice; harrowed thrice	Oct. 30. 6 lb., in 28 in. drills ..	1 cwt. super., 1 cwt. kainit, ¼ cwt. bone-flour; total 2¼ cwt. Cost, 16s.	June	50 tons Garton's Gatepost, 70 tons Sutton's Yellow Intermediate, 60 tons Sutton's Sugar	..

Experimenter—E. Marfell, Toko.

Volcanic loam on papa formation	Mangels, after green oats, Sutton's Sugar, Sutton's Long Red, Jersey Queen, Sutton's Prizewinner Yellow Globe	Ploughed Sept.; disced and harrowed; ploughed Oct., and cultivated several times to eradicate couch	Oct. 31. 6 lb. in 20 in. drills ..	3 cwt. slag, 1 cwt. super., ⅛ cwt. sulph. pot.; total, 4¼ cwt. Cost, £1 1s. 10d.	May 28	43½ tons Sutton's Sugar, 31¼ tons Sutton's Long Red, 47½ tons Jersey Queen, 35½ tons Sutton's Prizewinner Yellow Globe	"The Long Red and Sugar had not matured at the date harvested; the Jersey Queen and Prizewinner had fully matured. All roots were of good quality, especially the Prizewinner and Jersey, which latter were very heavy for their size. Better crops would have resulted with a warmer and drier summer."

Experimenter—Shaw and Son, Masterton.

Medium stiff loam upon clay subsoil	Mangels, following rape — Garton's New Sugar, Sutton's Sugar, Garton's Gatepost Sutton's Yellow Intermediate	Ploughed Aug.; disced twice in Oct., harrowed and rolled; ploughed, rolled, cultivated twice with spring tooth; harrowed, rolled, and drilled; twice intercultivated during growth, and hoed	Oct. 6 lb. in 30 in. drills ..	3 cwt. super., ¾ cwt. bonemeal, 5/16 cwt. sulph. pot., 5/16 cwt. sulph. amm.; total, 4⅜ cwt. Cost, £1 15s. 5d.	June	Not ascertained ..	"Owing to weather, very slow growth until January, after which they came on very well." Garton's New Sugar in comparison with other varieties did well, and would appear to yield the best.

Experimenter—J. Conaglen, Pihama, Hawera.

Sandy loam upon a stronger subsoil	Mangels, following turf — Garton's Gatepost, Sutton's Yellow Intermediate, Sutton's Sugar, Sutton's Yellow Globe	Ploughed Sept.; disced four times; hand-hoed, thinned and transplanted, where necessary; hoed Feb. 2 and 26	Nov. 11. 6 lb. in 27 in. drills ..	2 cwt. super., ⅜ cwt. bonemeal, ¼ cwt. sulph. amm., ¼ cwt. sulph. pot., ⅛ cwt. gypsum; total, 3 cwt. Cost, 19s 4d.	July	30 tons Garton's Gatepost, 24 tons Sutton's Yellow Intermediate, 36 tons Sutton's Sugar, 34 tons Sutton's Yellow Globe	The season was very cold, hailstorms with north-easterly winds prevailed until plants were five weeks old. A poor season for mangels in this district.

Experimenter—S. Lancaster, Fitzherbert.

Alluvial ..	Mangels, following potatoes and green oats — Yellow Globe, Long Red	Ploughed Sept.; ploughed Nov.; disced thrice; well harrowed and rolled	Nov. 30. 4 lb. in 24 in. drills ..	1¼ cwt. super., 1¼ cwt. kainit, ⅛ cwt. bonemeal, ¼ cwt. sulph. amm., ¼ cwt. gypsum; total, 3⅛ cwt. Cost, 15s. 9d.	June 20	Yellow Globe gave a heavier yield than Long Red	"The Yellow Globe germinated better than the Long Red. Much transplanting was therefore necessary with the latter variety."
" ..	Jersey Queen, Sutton's Yellow Intermediate ..	Ditto	Ditto	In addition to the above, 10 loads of farmyard manure applied to ½ acre	" 20 ..	The Jersey Queen gave best results	"I consider the Jersey Queen has done by far the best."

Description of Soil.	Variety of Crop.	Cultivation.		Manures per Acre.	Harvested.	Yield per Acre.	Remarks.
			ROOT CROPS—*continued.*				
			Experimenter—J. H. Graham, Eltham.				
A sandy loam upon gravel	Mangels — Garton's New Sugar, Yellow Globe, Sutton's Sugar, Sutton's Prizewinner Yellow Globe, Garton's Large Golden Globe, Garton's Mammoth Long Red	Ploughed Oct.; disced four times; harrowed twice; rolled once	Oct. 31. 6 lb. in 28 in. drills ..	2 cwt. super., ¾ cwt. gypsum, ¼ cwt. ground limestone, 1 cwt. bonefiour, ¼ cwt. sulph. pot.; total 4¼ cwt. Cost, £1 1s.	..	21 tons 18 cwt. Garton's New Sugar, 20 tons 2 cwt. Yellow Globe, 25 tons 1 cwt. Sutton's Sugar, 27 tons 1 cwt. Sutton's Prizewinner Yellow Globe, 26 tons 2 cwt. Garton's Large Golden Globe, 23 tons 11 cwt. Garton's Mammoth Long Red	"The mangels came on very well for the first few weeks. The weather then broke, and there was a long spell of cold weather, which did a great deal of harm." Average weight of roots—Garton's New Sugar, 6 lb.; Yellow Globe, 8 lb.; Sutton's Yellow Globe, 8 lb.; Sutton's Sugar, 9 lb.; Sutton's Prizewinner Yellow Globe, 7 lb.; Garton's Large Golden Globe, 11 lb.; Garton's Mammoth Long Red, 11 lb.
			Experimenter—R. Kilpatrick, Waiongona, Taranaki.				
Light sandy loam upon a medium porous subsoil	Mangels, following green oats—Sutton's Sugar, Sutton's Golden Tankard, Sutton's Prizewinner Yellow Globe, Sutton's Long Red	Ploughed 6 in. deep, Oct. 11; disced twice, Oct. 20; disced twice, Oct. 30; harrowed twice, Nov. 7; disced once, harrowed once, Nov. 16 and 20. Mangels were thinned and hoed once	Nov. 20. 6 lb. in 21 in. drills ..	1½ cwt. super., 1 cwt. bonefiour, 1½ cwt. kainit, ½ cwt. sulph. amm., ½ cwt. gypsum; total, 4¾ cwt. Cost, £1 11s. 4d.	June	40 tons 8 cwt., Sutton's Sugar, 19 tons 8 cwt. Sutton's Golden Tankard, 36 tons 16 cwt. Sutton's Prizewinner Yellow Globe, 32 tons 8 cwt. Sutton's Long Red	"Owing to the scarcity of labour these crops were not cultivated as much as they should have been. That fact and the wet cold season, I think, accounts for the small size of the roots."
			Experimenter—B. S. Longstaff, Bell Block.				
6 in. medium loam upon yellow loam subsoil	Mangels, following grass — Garton's Long Red, Sutton's Sugar, Jersey Queen, Garton's Globe, Sutton's Prizewinner Yellow Globe	Ploughed out of grass Oct. 11; disced thrice, tined once, rolled once during interval; hoed twice, Dec. 20 and Jan. 14	Nov. 14. 6 lb. in drills 21 in. ..	1¾ cwt. super., ¾ cwt. bonemeal, ¼ cwt. blood and bone, ⅛ cwt. sulph. pot., ⅛ cwt. sulph. amm. ⅛ cwt. gypsum; total, 3⅝ cwt. Cost, £1 11s. 2d.	June	41 tons 8 cwt. Garton's Long Red, 44 tons 12 cwt. Sutton's Sugar, 39 tons 8 cwt. Jersey Queen, 37 tons Garton's Globe, 34 tons 16 cwt. Sutton's Prizewinner Yellow Globe	All these plots, like the others, suffered by the cold weather experienced during the early stages of growth.

Experimenter—A. Oliver, Ohangai, Hawera.

Black sandy loam on free sandy loam; old pasture	Carrots — Altringham, Barribal, Sinclair's Champion, Sutton's White Belgian	Ploughed June; disced Sept.; disced Oct.; harrowed thrice: ploughed Oct.; disced twice, harrowed thrice	Oct. 30. 2 lb. in 14 in. drills ..	200 lb. of following mixture: 100 lb. super., 40 lb. blood, 32 lb. bonemeal, 28 lb. sulph. pot., 5 lb. sulph. amm., 10 lb. gypsum. Cost, 12s. per acre for 200 lb. of mixture	June	48 tons Altringham, 47 tons Barribal, 46 tons Sinclair's Champion, 50 tons Sutton's White Belgian	..

Experimenter—R. Kilpatrick, Waiongona, Taranaki.

Light sandy loam, 6 in., upon a yellow subsoil	Carrots, following green oats — Barriball, Long Red Altringham, Sutton's Long Red Cattle, White Belgian	Ploughed Oct. 11, 6 in. deep; disced twice, Oct. 20 and 30; harrowed twice, Nov. 7; disced once, harrowed once, Nov. 16 and 20	Nov. 20. In 14 in. drills ..	1½ cwt. super., ¾ cwt. blood, ¾ cwt. bonemeal, ½ cwt. sulph. pot., ½ cwt. gypsum; total, 2⅝ cwt. Cost, 17s. 6d.	..	18 tons 8 cwt. Barriball, 13 tons 2 cwt. Long Red Altringham, 13 tons 2 cwt. Sutton's Long Red Cattle, 27 tons 4 cwt. White Belgian	"The White Belgian were the heaviest roots. The very wet season, I think, was the cause of small size of roots."

Experimenter—B. Morris, Rongokokako.

Light loam, about 7 in.	Carrots — Sinclair's Champion	Skim-ploughed Aug. 8; harrowed Aug. 14; limed Aug. 29; harrowed Aug. 6 and 20; disced and harrowed Oct. 5; ploughed 8 in. Oct. 9; harrowed Oct. 11; disced Oct. 30; hoed frequently between drills	Nov. 2. In 17 in. drills ..	6 cwt. lime. Cost, 5s. 3d. ¾ cwt. super., ⅛ cwt. blood ½ cwt. bonemeal, ⅛ cwt. sulph. pot., ⅛ cwt. gypsum; total, 1⅞ cwt. Cost, 8s. 10½d.	June	20 tons	A splendid crop of small roots.
Ditto	Swedes	Much as above ..	Owing to wet weather, only sown Jan. 3; second sowing Feb. 1	6 cwt. lime, 25 lb. super., 50 lb. bonemeal, 5 lb. sulph. pot., 5 lb. gypsum; total, 85 lb. Cost, 4s. 11½d.	..	..	Seed came up well, but fly took the lot. Swede crop a failure all over the district. Some farmers drilled them three times.

Experimenter—W. Arundell, Patea.

Top soil sandy loam; porous yellow subsoil	Carrots — Sinclair's Champion, Arundell's Selected Sinclair's Champion, Sutton's Barribal	Ploughed 7 in. July 15; harrowed Aug. 22; scuffled Aug. 29; harrowed Sept. 11, 22, and Nov. 1; intercultivated several times during growth	Nov. 1. 8 lb. in 16 in. drills ..	2 cwt. super., ½ cwt. sulph. pot., ½ cwt. sulph. amm. Cost, £1 6s. 8d.	May 28	Sinclair's Champion, 46 tons 19 cwt. roots, 8 tons 18 cwt. tops; Arundell's Selected Sinclair's Champion, 48 tons 12 cwt. roots, 6 tons 17 cwt. tops; Sutton's Barribal, 59 tons 13 cwt. roots, 12 tons 3 cwt. tops	Weight average root, Sinclair's Champion, 1 lb. 7 oz.: Arundell's Selected Sinclair's Champion, 1 lb. 10 oz.; Sutton's Barribal, 1 lb. 12 oz. These small plots consisted of single rows, each 81 yards long; were sown thickly and then thinned as required. The fact of there being no blanks in these plots accounts for heavy yield obtained.

Description of Soil.	Variety of Crop.	Cultivation.	Seed sown.	Manures per Acre.	Harvested.	Yield per Acre.	Remarks.
			ROOT CROPS—*continued.*				
			Experimenter—W. Arundell, Patea.				
Top soil sandy loam; porous yellow subsoil	Carrots — Sutton's Improved Red Intermediate	Ploughed 7 in. July 15; harrowed Aug. 22; scuffled Aug. 29; harrowed Sept. 11, 22, and Nov. 1	Nov. 1. 8 lb., in 16 in. drills ..	2 cwt. super., ¼ cwt. sulph. pot., ½ cwt. sulph. amm. Cost, £1 6s. 8d.	May 28	Sutton's Improved Red Intermediate, 34 tons 16 cwt. roots, 5 tons 14 cwt. tops	Average weight of roots—Intermediate, 1 lb. 3 oz.; White Belgian, 2 lb. 2 oz. These plots consisted of single rows, each 81 yards long; were sown thickly, and thinned as required. The fact of there being no blanks in these plots accounts for heavy yield obtained.
Ditto	Sutton's Giant White Belgian	Intercultivated several times during growth	Ditto	Ditto	,, 28 ..	Sutton's Giant White Belgian, 59 tons 19 cwt. roots, 7 tons 5 cwt. tops	
			RAPE.				
			Experimenter—J. Steele, Towai, Bay of Islands.				
Clay loam upon clay subsoil. Valley land, previously in grass for about ten years	Giant Kangaroo Rape	Ploughed Oct. 17; disced and harrowed Nov. 7; drills formed by plough; intercultivated by hand	Nov. 10. 6 lb.	2 cwt. slag, 1 cwt. blood and bone, ¼ cwt. sulph. pot.; total, 3¼ cwt. Cost, £1 0s. 1d.	Mar.	Good average crop ..	"Cut regularly for cows. In all plots the plants had a bad start, owing to unfavourable spring."
			MAIZE				
			Experimenter—W. Arundell, Patea.				
6 in. to 8 in. medium loam on light yellow clay subsoil. (Previous crop, carrots)	Black Mexican sweet corn	Land ploughed July 15; cultivated frequently until time of sowing, and intercultivated after	Oct. 30. In drills, 32 in. ..	1½ cwt. super., ¼ cwt. bonemeal, ½ cwt. gypsum, ½ cwt. sulph. pot., ½ cwt. sulph. amm.; total, 2¼ cwt. Cost, 14s. 7d.	April 28	20 bushels	After the cobs were picked the stalks were cut and fed to cows, which eat them freely.
6 in. to 8 in. medium loam upon a porous yellow subsoil. (Previous crop, carrots)	Kendall's Early Giant Sweetcorn	Ploughed July 15, 7 in. deep; cultivated several times and intercultivated after sowing	Oct. 30. In drills, 32 in. apart ..	1½ cwt. super., ¼ cwt. bonemeal, ½ cwt. sulph. pot., ½ cwt. sulph. amm., ½ cwt. gypsum; total, 2½ cwt. Cost, 14s. 5d.	,, 28	35 bushels	"After cobs were harvested the stalks were fed to cows, which eat them readily. Consider 2 bushels about the right amount to sow."
			Experimenter—S. Lancaster, Fitzherbert.				
12 in. dark sandy loam upon a sandy clay subsoil. (Previous crop potatoes and green oats)	Eclipse maize ..	Ploughed Nov. 1, Dec. 15	Dec. 16. 1¾ bushels broadcast ..	1½ cwt. super., ½ cwt. sulph. pot., ¼ cwt. sulph. amm., ¼ cwt. gypsum; total, 1⅝ cwt. Cost, 12s. 4d.	Mar. 20	48 tons (estimated) ..	The area weighed in these experiments was too small to be reliable, but the relation of yields in the several varieties is about as stated.
Ditto	Raupo Red Cob Ensilage	Ditto	Ditto	Ditto	,, 20	56 tons (estimated) ..	Would recommend a rather earlier sowing if season was suitable. I do not think the above could be improved on.
.. .. ..	Thoroughbred White Flint	,, ...	,, ...	,, ...	,, 20	,, ,, ..	It was a splendid crop.

Experimenter—Allan and Campbell, Taradale.

Alluvial	Raupo Red Cob Ensilage	Ploughed early, and well and frequently cultivated	Not sown till late in the season	½ cwt. super., ¼ cwt. slag, ⅛ cwt. bonedust, ⅛ cwt. sulph. pot.; total, 1⅛ cwt. Cost, 10s. 2d. Previously limed at rate of 5 cwt. Cost, 4s. 2d.	May	85 bushels on cob	Red cob ensilage was introduced by the Department from America, and the seed used here was saved off a trial lot grown on the Northern Wairoa. In Mr. S. Lancaster's experiment at Fitzherbert the same seed was used. In trials made one season by the Transvaal Department of Agriculture with about one hundred varieties of maizes, in nearly every case acclimatized seed returned the heaviest yields and the best quality.—G.B.
„	Common Yellow Horsetooth	Ditto	Ditto	Ditto	„	35 bushels on cob	

Experimenter—James Waugh, Mangatoro.

"These two sorts (Red Cob Ensilage and Hogan) have done the best."

Experimenter—George Pott, New Plymouth.

Poor hillside; 4 in. dark loam on yellow subsoil	Quarantine maize	Ploughed Aug. 31, out of ratstail; harrowed thrice, Sept. 22; spade-harrowed Oct. 20; four times, Oct. 21; twice tine-harrowed Oct. 30; thrice, Dec. 14	Dec. 14. 1 bushel per acre in 14 in. drills	⅛ cwt. blood, 1½ cwt. super., ⅝ cwt. bonemeal, ¼ cwt. sulph. pot.; total, 2¼ cwt. Broadcasted, Oct. 30. Cost, 14s. 2d.	May 4. (Cut for ensilage)		Matures quickly. A dwarf and early maturing variety. Too small to be of much use for silage.
Ditto	Early Yellow Languedoc maize	As above. Cultivated between drills occasionally with Planet Jr.	Dec. 14. 2 bushels in 14 in. drills	Ditto	May 4		Does not mature so quickly as Quarantine. Useful for silage. Medium height. A useful variety where Large Horse-tooth variety is not suitable. A recent introduction by the Department. Indications are that next to Quarantine this maize matures more quickly than any variety yet in New Zealand.
Poor hillside, 4 in. loam on yellow subsoil	Red Hogan	Ploughed Aug. 31; harrowed Sept. 23; spade-harrowed thrice, Oct. 20; harrowed four times, Oct. 21; harrowed Oct. 30; horse-hoed between drills Jan. 8 and 29	Oct. 30. 1 bushel in double 7 in. drills, 28 in. between rows	1 1/11 cwt. super., 4/11 cwt. bonemeal, 2/11 cwt. blood, 2/11 cwt. sulph. pot., 2/11 sulph. amm. Cost, 14s. 10d.	April 25		"Growth retarded by storms and cold weather." Consider this a very suitable and hardy variety. Cut for ensilage.

Description of Soil.	Variety of Crop.	Cultivation.	Seed sown.	Manures per Acre.	Harvested.	Yield per Acre.	Remarks.
MAIZE—*continued.*							
Experimenter—F. Cresswell, Ballance.							
Dark-brown loam, 6 in. on a sandy loam subsoil	Selected Yellow Moruya maize	Ploughed Aug. 25; disced twice, Sept. 6, Oct. 26; harrowed and rolled Oct. 30; harrowed after drilling Oct. 30; rolled Nov. 2; harrowed Dec. 7; horse-hoed Jan. 9, Feb. 3	Oct. 30. 90 lb. per acre in double 7 in. drills, 28 in. between rows	1½ cwt. super., ½ cwt. bonemeal, ½ cwt. kainit, ¼ cwt. sulph. amm., ½ cwt. gypsum; total, 2¾ cwt. Cost, £1 3s. 3d.	April 8	8 tons 13 cwt. ..	Affected very badly by the cold bitter winds. This year maize sown in December did better than the earlier crops.
Experimenter—E. Harper, Matahiwi, Masterton.							
Sandy loam, about 10 in. upon a gravel loam subsoil. (Previous crop, swedes)	Flint maize and Thousand-headed kale	Ploughed Sept. 26; harrowed Sept. 27; cultivated Oct. 7; rolled and limed Oct. 11; harrowed and rolled Oct. 12; drilled Oct. 16	1½ lb. kale and 1½ bushels maize per acre	1¾ cwt. super., 1 cwt. kainit, ½ cwt. bonedust, ¼ cwt. sulph. amm.; total, 3½ cwt. Lime at rate of 5 cwt., 4s. 2d. Total cost, £1 5s. 6d.	..	The grazing has been equal to 61 sheep for 25 days	Owing to the season, poor growth was made by the maize crop. This combination was used, and drilled after a special method with a view to harvesting kale-seed therefrom next season.
BEANS AND PEAS.							
Experimenter—William Arundell, Patea.							
6 in. to 8 in. medium loam on a yellow porous subsoil	Soya beans ..	Ploughed 7 in. July 15; cultivated frequently, intercultivated, and earthed up	Oct. 23. In 16 in. drills ..	1¼ cwt. basic super., ½ cwt. boneflour, ¼ cwt. sulph. pot.; total, 2 cwt. Cost, 13s. 4d.	Mar. 15	3½ cwt.	Poor yield; cold winds cut them to pieces.
Experimenter—J. Steele, Towai, Bay of Islands.							
Clay loam upon clay subsoil. Valley land, previously in grass for about ten years	Soya beans ..	Ploughed Oct. 20; disc-ploughed and harrowed Nov. 7	Nov. 10. 24 lb. sown in drills 14 in. apart; drills made with plough, and balance of work done by hand	2 cwt. slag, 1 cwt. blood and bone, ¼ cwt. sulph. pot.; total, 3¼ cwt. Cost £1 0s. 1d.	April 20	..	Plants were well podded. Harsh dry winds prevailed for months. Plants were very vigorous.

Experimenter—D. Johnstone, Raumata.

Black soil, 9 in. deep, upon a medium stiff subsoil	Partridge peas ..	Ploughed out of turf July 12; disced three times, Aug. 14; harrowed Sept. 1, 12, and Oct. 3	Oct. 3. 2 bushels	84 lb. lime, 1½ cwt. super., ½ cwt. bonemeal; ½ cwt. sulph. pot.; ⅛ cwt. sulph. amm.; 1/10 cwt. gypsum per ¼ acre. Cost, 16s. 11d.				Wet weather caused crop to rot. "A heavy crop."

Experimenter—George Pott, New Plymouth.

Dark loam, about 4 in., upon a yellow subsoil. Poor hillside ploughed out of ratstail	Blue Imperial peas..	Ploughed Aug. 31; harrowed Sept. 22; thrice spade-harrowed Oct. 20; harrowed four times, Oct. 21	Oct. 23. 33 lb. to ¼ acre, in 7 in. drills	40 lb. per ¼ acre of following: 1/20 cwt. blood, 1⅛ cwt. super., 1/20 cwt. bonemeal, 1/20 cwt. sulph. pot.; total, 2½ cwt. Cost, 2s. 3d. per 40 lb.	Feb. 26	..	..	A fair yield considering the inclement season.

Experimenter—F. Cresswell, Ballance.

Brown loose top soil, 4 in., on a sandy loam subsoil	Yorkshire Hero peas	Ploughed Aug. 31; disced twice, Sept. 6; disced four times, Oct. 6; harrowed and rolled Oct. 7; harrowed once and rolled once just before plants appeared	Oct. 7. 2½ bushels in 7 in. drills	1½ cwt. super., 1½ cwt. bonedust; total, 3 cwt. Cost, 18s. 2d.	Feb. 17	27 bushels peas, 1,640 lb. straw		"Affected by the cold winds." Both these plots had been ploughed out of grass, and the take was not too good a one. I noticed several patches of considerable area distributed throughout both plots, where the growth of peas was stunted and the colour yellow. On others the growth and colour were good, and, when examined, the roots showed a fair number of nodules, whereas in the yellow patches no nodules were present on the roots. The bacteria in this soil were evidently not too numerous at first, but were beginning to increase. It is possible that if peas were grown here next year a better crop would be secured in consequence.
Ditto	Ditto	Ditto	Ditto	28 lb. blood, 68 super., 52 lb. bonemeal, 16 lb. sulph. pot.; total, 164 lb. Cost, 9s. 8½d. 8 cwt. ground limestone; cost, 7s.	,, ...	22½ bushels		

Experimenter—G. L. Marshall, Bull's, Turakina Road.

Clay loam on a stiff clay subsoil	Peas on summer fallow. Early Minter and Blue Imperial	Disced and harrowed May; ploughed and harrowed Aug.	Sept. 5. In 7 in. drills; 2¾ bushels	Half of each area, limed at the rate of 2½ cwt.; cost, 2s. 2d. ½ cwt. bonemeal used; cost, 3s. 6d.	..	45 bushels Early Minter on unlimed, 50 bushels on limed. 40 bushels Blue Imperial on unlimed, 45 bushels on limed		"I consider the peas very satisfactory. Should sow 3½ bushels in future. The cultivation of the land and time of sowing all seem about right. Peas leave the land in a splendid state for future cultivation. The oats sown in autumn after the peas are doing very well."

Description of Soil.	Variety of Crop.	Cultivation.	Seed sown.	Manures per Acre.	Harvested.	Yield per Acre.	Remarks.
BEANS AND PEAS—*continued.*							
Experimenter—R. Urquhart, Runciman.							
Chocolate loam upon stiffer subsoil. Ploughed out of grass	White Pearl peas ..	Ploughed June; harrowed and disced twice; harrowed and rolled Oct.	Oct. 21. Drilled 3 bushels in 7 in. drills	2 cwt. basic super., ½ cwt. sulph. pot., ½ cwt. bonemeal, ½ cwt. gypsum, per ½ acre. Cost, 15s.	Jan. 20	30 bushels. ..	..
Ditto	„ ..	Ditto	Ditto	No manure, only lime, 3 cwt. per ½ acre. Cost, 2s. 6d.	„ 30	3 bushels	It is evident phosphates are much required here.
Experimenter—J. Hunter, Masterton.							
Stiff loam on clay subsoil	Blue Prussian peas	Ploughed Aug. 13 and Sept. 11; cultivated, harrowed, and rolled Oct. 8	Oct. 8. 3 bushels in 7 in. drills	6 cwt. of ground limestone worked well in at time of drilling, 1½ cwt. super., 14 lb. sulph. pot. Cost, 9s. 6d.	..	Limed land yielded 44 bushels per acre; unlimed, 36 bushels	"A marked difference in the growth of peas on limed portion. I am satisfied on my ground when growing peas it would pay to give the whole area a liberal dressing of lime. I think this district suitable to the successful growing of peas."
FORAGE.							
Experimenter—W. Arundell, Patea.							
6 in. to 8 in. medium loam on light yellow clay subsoil	Mixed forage ..	Potatoes dug Feb. 28; Ground was then scuffled and harrowed, and sown Mar. 9	Mar. 9. 13 lb. Golden tares, 10 lb. Dun oats, 4 lb. ryecorn, per ⅞ acre, in 6 in. drills	⅞ cwt. super., ½ cwt. sulph. pot.; total, 1 cwt. Cost, 6s. 4d.	June 21 ..	7 tons 19 cwt. ..	Ryecorn and Dun oats appeared to smother the vetches. Ryecorn and Dun oats are sprouting again, but no sign of vetches.

SOUTH ISLAND.

WHEAT.

LINCOLN DISTRICT.

Variety Test, conducted by Leonard Hartnell, Leeston.

THE land is a deep loam on clay subsoil, and the soil of the plots was as nearly uniform in character as possible. In English grass for three years prior to 21st July, 1911, when ploughed 5 in. deep, disc-harrowed twice, and tine-harrowed. Rolled with Cambridge roller on 12th August; seed drilled in on 14th August; tine-harrowed on 7th September. Ten varieties were sown in tenth-of-acre plots, the seeding being at the rate of 2 bushels per acre. Each plot was fertilized with superphosphate at the rate of 1 cwt. Plots 7 and 8 were reaped on 7th February, the other plots on 20th February. Results:—

Plot.	Variety.	Yield per Acre.	Per Square Yard.	
			Plants.	Stalks.
		Bushels.		
1	Solid Straw Tuscan	70·35	111	357
2	Velvet Chaff	47·63	108	256
3	Pearl	49·10	124	292
4	Red Chaff	47·63	120	272
5	Marshall's Improved Tuscan	58·53	107	270
6	Red Marvel	50·55	102	264
7	Red Straw Tuscan	46·17	130	259
8	Federation	29·30	121	416
9	White Marvel	52·03	88	215
10	Treasure	52·03	113	239

Inspector Scott, Leeston, reports.—Plot 1: From the first Solid Straw took the lead and held it all through. On 10th October, the date of the first inspection of plots, this wheat was almost twice as tall as wheats in plots 2, 3, and 4. Plot 2: For the first two months the growth of Velvet Chaff above ground was slow, but throughout the season it had a healthy appearance. The date of sowing was too late for this variety. Plot 3: Remarks regarding Velvet Chaff apply also to Pearl, both as regards growth and appearance. Plot 4: Compared with the Tuscans, Red Chaff also during the early period of growth appeared to a disadvantage, but it gradually improved its position right up to the date of harvesting. Plot 5: When inspected on 10th October Marshall's Improved Tuscan in the matter of vigorous growth was a good second to Solid Straw Tuscan, and kept this position right up to harvest. The straw of this variety was long and fairly strong. The heads were well filled. Plot 6: During the earlier stages Red Marvel was slow of growth, but later on it made a steady advance. The heads were large and well filled, but showed a decided tendency to droop and hang down. This variety would probably shake out rather readily. Plot 7: Red Tuscan did not do as well as most of the other varieties. It was short in the straw, and ripened early. Plot 8: When inspected on 10th October Federation was surpassed in vigour of growth only by Solid Straw Tuscan and Marshall's Improved Tuscan, but it failed to hold this position long. It appeared to rush into ear prematurely, the straw being very short. It was attacked by Hessian fly, being the only variety so attacked. No doubt being the first

variety to ripen was the reason it was the only one attacked by the fly. It was also badly attacked by small birds. The yield of this plot from these causes was materially reduced. Plot 9: For the first two months or so White Marvel was slow of growth, but it steadily improved in the latter part of the season. Like Red Marvel, this variety would be likely to shed the seed rather readily. Plot 10: Backward at first, Treasure, like the other French varieties, steadily improved, but had not quite their attractive appearance.

ASHBURTON DISTRICT.

Manurial Test, conducted by J. Bonifant, Wakanui.

The land is of a good character, being a free soil on a clay subsoil over gravel, and the soil of the plots was as uniform as possible. In oats 1908, in grass from 1909 to 1911. Skim-ploughed in March, then rolled and grubbed, and ploughed in June, 1911. Disced and tine-harrowed on 21st August, and seed sown. The twentieth-of-an-acre plots were seeded with Velvet Chaff at the rate of 2 bushels per acre. Plots harvested on 27th February, 1912. Results:—

Plot.	Manures per Acre.	Cost of Manures per Acre.	Yield per Acre.	Effect of Manuring.	Per Square Yard.	
					Plants.	Stalks.
		s. d.	Bushels.	Bushels.		
1	Superphosphate, ½ cwt.; seed gypsum, 1 cwt.	4 7½	19·54	Loss, 12·21	260	455
2	Superphosphate, 1 cwt.; seed gypsum, ½ cwt.	5 10½	25·64	Loss, 6·11	256	347
3	Superphosphate, 1½ cwt...	7 1½	30·53	Loss, 1·22	299	536
4	No manure	..	31·75	..	239	403
5	Superphosphate, 1 cwt.; bonedust, ½ cwt.	7 9	34·20	Gain, 2·45	300	407
6	Superphosphate, 1 cwt.; sulphate of potash, ½ cwt.; seed gypsum, ½ cwt.	9 2½	36·64	Gain, 4·89	244	345

Inspector Branigan reports: The wheat (in this as well as in the variety tests) was sown on 21st August. It was, consequently, rather late in being sown, but brairded well. The spring was very late, but the wheat came along very nicely in the summer. Owing to unfavourable weather in January and February, and the phenomenal growth of clover, &c., all late-sown crops, such as these, did not yield as well as they promised to do.

Variety Test, conducted by J. Bonifant, Wakanui.

The varieties were sown in twentieth-of-an-acre plots with no manure, the seeding being at the rate of 2 bushels per acre. Harvested on 27th February, 1912. Results:—

Plot.	Variety.	Yield per Acre.	Per Square Yard.	
			Plants.	Stalks.
		Bushels.		
1	Treasure	39·08	244	345
2	White Marvel	35·42	300	407
3	Federation	28·09	182	463
4	Red Tuscan	39·08	184	337
5	Red Marvel (damaged)	31·14	186	418
6	Marshall's Improved	28·09	171	344
7	Red Chaff	37·86	132	401
8	Pearl	35·42	204	430

TIMARU DISTRICT.

Manurial Test, conducted by J. King, Fairview, Timaru.

The land is a clayey loam with a heavy clay subsoil, and the soil of selected plots was as nearly uniform in character as possible. The land was in wheat in 1905; in grass from 1906 to 1909; in wheat in 1910; skim-ploughed on 15th April, 1911; grubbed three times on 24th April; ploughed on 8th May; harrowed twice on 22nd May, and the seed drilled in on 1st June. The tenth-of-an-acre plots were seeded with Velvet Chaff at the rate of 2 bushels per acre. Plots harvested on 20th February. Results:—

Plot.	Manures per Acre.	Cost of Manure per Acre.	Yield per Acre.	Effect of Manuring.	Per Square Yard.	
					Plants.	Stalks.
		s. d.	Bushels.	Bushels.		
1	Superphosphate, ½ cwt.; seed gypsum, 1 cwt.	4 7½	42·75	Gain, 6·17	155	262
2	Superphosphate, 1 cwt.; seed gypsum, ½ cwt.	5 10½	37·08	,, 0·50	262	318
3	Superphosphate, 1½ cwt...	7 1½	38·41	,, 1·83	172	257
4	No manure	..	36·58	..	187	280
5	Superphosphate, 1 cwt.; bonedust, ½ cwt.	7 9	38·33	Gain, 1·75	179	244
6	Superphosphate, 1 cwt.; sulphate of potash, ½ cwt.; seed gypsum, ¼ cwt.	9 2½	36·33	Loss, 0·25	195	272

Inspector Huddleston, Timaru, reports: All plots looked very fine, with the exception of Nos. 4 and 6. These two were not so strong in growth or so well headed as the others.

Variety Test, conducted by J. King, Fairview, Timaru.

The varieties, sown in tenth-of-an-acre plots, were seeded at the rate of 2 bushels per acre. Each plot was fertilized with superphosphate at the rate of 1½ cwt. per acre (cost, 7s. 3¾d.). Harvested on 20th February, 1912. Results:—

Plot.	Variety.	Yield per Acre.	Per Square Yard.	
			Plants.	Stalks.
		Bushels.		
1	Solid Straw	41·75	213	310
2	Red Marvel	42·21	123	213
3	Marshall's Improved Tuscan ..	40·91	186	342
4	Red Tuscan	35·66	161	315
5	Federation	32·25	118	285
6	Red Chaff	36·16	162	280
7	Pearl	39·08	182	305

Inspector Huddleston, Timaru, reports: Plots 1, 2, and 3 showed good growth all the season; No. 4 was not so good; No. 5, very weak growth; No. 6, of fair growth; and No. 7, good.

WAIMATE DISTRICT.

Manurial Test, conducted by W. G. Paul, Waimate.

The land is a sandy loam with clay subsoil, and the soil of the plots was as nearly uniform in character as possible. Was in English grass for three years prior to 1907; in wheat in 1909; sown with peas in 1910; disced and ploughed on 17th March, 1911; ploughed and tine-harrowed on 5th June; received three strokes tine harrows on 7th

June. Seed (Velvet Chaff) drilled in on 4th October at the rate of 2 bushels per acre; the crop was tine-harrowed. Crop harvested on 15th February, 1911. Results:—

Plot.	Manures per Acre.	Cost of Manure per Acre.	Yield per Acre.	Effect of Manuring.	Per Square Yard.	
					Plants.	Stalks.
		s. d.	Bushels.	Bushels.		
1	Superphosphate, ½ cwt.; seed gypsum, 1 cwt.	4 7½	50·58	Gain, 4·33	206	228
2	Superphosphate, 1 cwt.; seed gypsum, ½ cwt.	5 10½	82·58	„ 36·33	159	290
3	Superphosphate, 1½ cwt...	7 1½	87·58	„ 41·33	103	287
4	No manure	..	46·25	..	150	205
5	Superphosphate, 1 cwt.; bonedust, ½ cwt.	7 9	44·91	Loss, 1·34	95	271
6	Superphosphate, 1 cwt.; sulphate of potash, ¼ cwt.; seed gypsum, ¼ cwt.	9 2½	48·58	Gain, 2·33	108	272

Inspector Macdonald, Waimate, reports: All crops came away well; plot 3, containing 1½ cwt. superphosphate doing best; plot 2 (1 cwt. superphosphate ½ cwt. seed gypsum) coming next; plot 5 did not do so well. When growing the plots looked very well, the straw not being long, but was very thick on the ground.

Variety Test, conducted by W. G. Paul, Waimate.

Ten varieties were sown in tenth-of-an-acre plots without manure, the seeding being 2 bushels to the acre. Grain harvested on 15th February, 1912. Results:—

Plot.	Variety.	Yield per Acre.	Per Square Yard.	
			Plants.	Stalks.
		Bushels.		
1	Solid Straw Tuscan	44·83	109	409
2	Velvet Chaff	46·25	120	270
3	Pearl	46·58	170	309
4	Red Chaff	48·25	110	300
5	Marshall's Improved Tuscan ..	52·0	125	275
6	Red Marvel	61·58	88	148
7	Red Tuscan	44·25	100	286
8	Federation	25·16	150	292
9	White Marvel	31·0	125	266
10	Treasure	39·75	105	260

Inspector Macdonald reports: Of the ten varieties sown Red Marvel, Marshall's Improved Tuscan, Red Chaff, in order named, gave best results. Treasure came quickly in early stages, but the excessive wet season was unsuitable and told against best results. Federation did not do at all well, and this may be also attributed to wetness of season. All others did well. Red Marvel (one of the varieties introduced by the Department) came away strongly from the commencement and gave the best yield.

OAMARU DISTRICT.

Variety Test, conducted by John Macpherson, Totara Estate, Oamaru.

The land is a rich volcanic black soil with limestone formation, the soil of the plots being as uniform as possible. The land had been in potatoes the previous year, after being four years in grass. Ploughed 7 in. deep on 15th July, 1911; tine-harrowed (two strokes) on 17th, and wheat sown on 18th. The crop was rolled with a Cambridge roller on 22nd September, and was tine-harrowed (one stroke) at the end of the same

month. Eight varieties, of one-tenth acre each, were sown broadcast, without manure, and after sowing the ground was well harrowed with tine harrows. Results :—

Plot.	Variety.	Yield per Acre.	Per Square Yard.	
			Plants.	Stalks.
		Bushels.		
1	Solid Straw	62·50	64	237
2	Velvet	47·48	69	222
3	Pearl	52·36	68	242
4	Red Chaff	60·20	69	304
5	Red Marvel	53·57	57	313
6	Marshall's Improved Tuscan ..	55·21	72	303
7	Red Tuscan	47·76	69	304
8	Federation	Failure.		

Mr. J. Macpherson reports: No. 1 (Solid Straw) was the best variety grown, and no doubt it is the most suitable in this district. No. 2 (Velvet), being sown rather late in the season (18th July), did not turn out so well as it generally does when sown in the proper time—say, about 24th May. No. 3 (Pearl) was also sown too late in the season, but it yielded better than Velvet. No. 4 (Red Chaff) always does well in this district, and it can be sown much later than either Velvet or Pearl. Its yield was next to Solid Straw. No. 5 (Red Marvel): I like the appearance of this wheat better than that of any of the other varieties grown. It has a fine large head, and I purpose sowing all the seed sown on the one-tenth acre this season in order to test it thoroughly. No. 6 (Marshall's Improved Tuscan) is also a good wheat; it appears to suit this class of land. No. 7 (Red Tuscan) did not turn out so well as usual for this variety: it only yielded 47 bushels per acre. Generally does well in this district. No. 8 (Federation): This wheat is not at all suitable for the Oamaru district. The tenth-acre plots sown here turned out a complete failure. It brairded all right, and came out in ear earlier than any of the others, but before ripening it was badly attacked by rust and died off altogether. Other growers in this district have also found it a failure. I purposed sowing 20 acres in Federation wheat last season, but waited to see how it would yield in comparison with the others in the plots. My neighbours are all satisfied it is no use for this district.

BALCLUTHA DISTRICT.

Manurial Test, conducted by H. Snushall, Clydevale.

The land is a sandy loam, and the soil of the plots was uniform in character. It was in English grass in 1907, broken up and sown in turnips in 1908 and 1909, and in rape in 1910. Preparatory to the co-operative test it was ploughed on 8th May, 1911, being double-disced and tine-harrowed on 20th of same month. The tenth-of-an-acre plots were seeded to Solid Straw Tuscan at the rate of 2 bushels per acre on 29th May. The plots were harvested at end of March, 1912. Results :—

Plot.	Manures per Acre.	Cost of Manure per Acre.	Yield per Acre.	Effect of Manuring.	Per Square Yard.	
					Plants.	Stalks.
		s. d.	Bushels.	Bushels.		
1	Superphosphate, ½ cwt.; seed gypsum, 1 cwt.	4 7½	30·16	Loss, 1·26	115	355
2	Superphosphate, 1 cwt.; seed gypsum, ½ cwt.	5 10½	36·45	Gain, 5·03	93	384
3	Superphosphate, 1½ cwt...	7 1½	42·73	,, 11·31	79	274
4	No manure	..	31·42	..	132	385
5	Superphosphate, 1 cwt.; bonedust, ½ cwt.	7 9	40·22	Gain, 8·80	117	376
6	Superphosphate, 1 cwt.; sulphate of potash, ½ cwt.; seed gypsum, ½ cwt.	9 2½	38·96	,, 7·54	89	295

Mr. Snushall reports: The grain was sown too late for winter wheat in this district, and the seeding was on the light side. Had the plots not been frosted before harvesting they would have given enormous yields. No. 3 looked the best all the time, and in the end gave the best yield. The no-manure plot was slow in getting a start, and was nearly two weeks later in ripening.

Variety Test, conducted by H. Snushall.

The varieties sown on one-tenth-acre plots with special grain-manure (1⅔ cwt. per acre, at a cost of 11s. 8d. per acre) were seeded at the rate of 2 bushels per acre. Results:—

Plot.	Variety.	Yield per Acre.	Per Square Yard.	
			Plants.	Stalks.
		Bushels.		
1	Solid Straw	27·65	118	378
2	Velvet	36·45	126	311
3	Pearl	32·68	161	419
4	Red Chaff	40·22	143	371
5	Red Marvel	25·14	180	383
6	Marshall's Improved Tuscan ..	31·42	123	316
7	Red Tuscan	21·42	112	305

Mr. Snushall reports: Solid Straw Tuscan made strong growth from the start, but being on the outside suffered from depredations by rabbits, and in the end was frosted. Velvet Chaff came up vigorously and looked well to the end. Pearl showed to slightly lesser advantage. Though Red Chaff was disappointing in appearance right up to time of cutting, it gave the best yield, filling out remarkably well at the end. Red Marvel did poorly from the start. Marshall's Improved Tuscan came up early and always looked well, but was too thin. On its appearance the yield was good. The conditions were against Red Tuscan, which never looked well.

LAWRENCE DISTRICT.

Manurial Test, conducted by J. W. Gent, "Lynn," Greenfield.

The land was a clayey loam with a free clay subsoil, and the soil of the plots was of a uniform character. It was in English grasses for ten years; broken up and sown in turnips in 1909; put in oats in 1910. Ploughed on 1st June, 1911; cultivated twice, and tine-harrowed 1st September. Seed (Solid Straw Tuscan) drilled on 7th September in tenth-acre plots at the rate of 2 bushels to the acre, and harvested from 11th to 28th May, 1912. Results:—

Plot.	Manures per Acre.	Cost of Manure per Acre.	Yield per Acre.	Effect of Manuring.	Per Square Yard.	
					Plants.	Stalks.
		s. d.	Bushels.	Bushels.		
1	Superphosphate, ½ cwt.; seed gypsum, 1 cwt.	4 7½	35·05	Gain, 7·55	233	274
2	Superphosphate, 1 cwt.; seed gypsum, ½ cwt.	6 3	46·05	,, 18·55	256	308
3	Superphosphate, 1½ cwt...	7 10½	38·14	,, 10·64	254	288
4	No manure	..	27·50	..	282	319
5	Superphosphate, 1 cwt.; bonedust, ½ cwt.	8 6	40·55	Gain, 13·05	275	324

Inspector Barron, Lawrence, reports: The plots were sown too late for the best results, and the seeding rather thin for the district. Fully 2½ bushels should have been sown. The plots suffered to a small extent by the attacks of the grub. The wet season adversely affected the crop and made harvesting difficult.

Variety Test, conducted by J. W. Gent, "Lynn," Greenfield.

The varieties were sown on 7th September, 1911, in tenth-acre plots, 1½ cwt. of "Challenge" manure being used, the seeding being 2 bushels per acre. Results:—

Plot.	Variety.	Yield per Acre.	Per Square Yard.	
			Plants.	Stalks.
		Bushels.		
1	Velvet Chaff	30·25	377	407
2	Pearl	23·37	225	233
3	Red Tuscan	35·75	230	277
4	Red Chaff	39·87	282	290
5	Tuscan	21·64	187	283
6	Red Marvel	37·46	185	200

The remarks on the manurial plots apply to the variety test.

TAPANUI DISTRICT.

Variety Test, conducted by William Cullen, Crookston.

The land on which the plots were laid out is a clayey loam on clay subsoil, and was even in character. It was in grass from 1907 to 1910; in turnips (with 2 cwt. of turnip manure) in 1911; and was ploughed up in August, 1911, for present crop, being tine-harrowed, rolled, and worked to a fine tilth. Seed sown on 8th September at the rate of 2 bushels per acre with 2 cwt. of manure (superphosphate and bonedust), valued at 12s. per acre. Plots one-tenth acre. Results:—

Plot.	Variety.	Yield per Acre.	Per Square Yard.	
			Plants.	Stalks.
		Bushels.		
1	Solid Straw	28·10	109	237
2	Velvet Chaff	17·11	136	213
3	Pearl	18·33	140	243
4	Red Chaff	19·55	107	233
5	Marshall's Improved Tuscan ..	23·22	127	310
6	Red Marvel	30·55	100	291
7	Red Tuscan	19·55	92	176
8	Federation	21·99	95	253
9	White Marvel	23·22	98	259
10	Treasure	15·88	129	192
11	Velvet Ear	32·99	86	252

Inspector McCulloch, Tapanui, reports: All varieties brairded evenly, but, owing to being sown rather late and the seeding being light (2 bushels) for the time of year, the adverse weather later on in the season considerably affected their growth. The more delicate varieties suffered in consequence, and weeds made headway. Velvet Ear, sown under the same conditions but seeded heavier (3 bushels against 2 of the other varieties), took the lead during the whole season. Red Marvel was a good second.

OATS.

TIMARU DISTRICT.

Manurial Test, conducted by K. Mackenzie, Geraldine.

The soil of the plots, uniform as possible in character, is loamy with clay subsoil. It was in grass in 1906, wheat 1907, rape 1908, wheat 1909, turnips 1910, and swedes

1911. Preparatory for the tests it received one stroke of cultivator on 6th September; ploughed on 12th September; three strokes of tine harrows on 15th September; seed drilled in tenth-of-acre plots on 22nd September, and tine-harrowed. Variety sown, Triumph, at the rate of 3 bushels per acre. Harvested on 22nd February, 1912. Results:—

Plot.	Manures per Acre.	Cost of Manure per Acre.	Grain Yield per Acre.	Effect of Manuring.	Yield per Acre if chaffed.	Per Square Yard.	
						Plants.	Stalks.
		s. d.	Bush.	Bushels.	Tons.		
1	Superphosphate, ½ cwt. ..	2 4½	80·0	Gain, 3·25	5·67	102	311
2	Superphosphate, 1 cwt. ..	4 9	83·0	,, 6·25	5·80	79	268
3	No manure	..	76·75	..	4·99	99	307
4	Superphosphate, 1 cwt.; nitrate of soda, ¼ cwt.; seed gypsum, ¼ cwt.	9 3¾	87·0	Gain, 10·25	5·40	78	228
5	Superphosphate, 1 cwt.; sulphate of potash, ½ cwt.; seed gypsum, ¼ cwt.	9 0¾	82·75	,, 6·00	5·80	86	250

Inspector Huddleston, Timaru, reports: From the start the plots made even growth throughout, being healthy and strong. Practically no difference in appearance could be noted.

Variety Test, conducted by K. Mackenzie, Geraldine.

The soil and cultivation of the plots were the same as in the manurial test. The seed was sown at the rate of 3 bushels per acre; no manure. Harvested on 22nd February. Results:—

Plot.	Variety.	Grain Yield per Acre.	Yield per Acre if chaffed.	Per Square Yard.	
				Plants.	Stalks.
		Bushels.	Tons.		
1	Yielder	49·5	3·64	64	196
2	Storm King	46·75	3·78	75	200
3	Sparrowbill	56·25	5·53	107	415
4	Dun	46·25	4·32	78	552
5	Garton	63·5	4·99	79	463
6	Garton's Yielder (imported) ..	10·0	1·75	16	69
7	Algerian	25·0	4·18	61	617
8	Triumph	65·25	7·56	70	247
9	Danish	58·25	4·05	67	278
10	Black Excelsior	26·75	2·70	97	155

Inspector Huddleston, Timaru, reports: Plot 1, good strong growth and healthy appearance; 2, good strong growth; 3, extra good; 4, good; 5, extra good; 6, owing to seed being imported yield was poor; 7, weak growth and short heads; 8, extra good and strong, and suits district; 9, good; 10, weak growth.

Oamaru District.

Variety Test, conducted by J. Macpherson, Totara Estate.

Soil of a rich black volcanic and limestone formation, becoming very sticky or "tarry" when wet; subsoil of similar formation, but of yellowish colour, turning black on exposure to weather. Pasture for ten years; wheat crop in 1907–8 and 1908–9; potato crop 1909–10; wheat crop, 1910–11. Stubble land, ploughed July, 1911, and left lying to the frost until it was disc-ploughed and tine-harrowed twice before sowing;

rolled before and after seeding (on 8th September). Sown on tenth-of-acre plots at rate of 3 bushels per acre. Seed drilled in. Harvested on 21st May, 1912. Results :—

Plot.	Variety.	Grain Yield per Acre.	Yield per Acre if chaffed.	Per Square Yard.	
				Plants.	Stalks.
		Bushels.	Tons.		
1	Yielder	74·93	4·05	76	198
2	Storm King	71·41	5·13	81	290
3	Sparrowbill	68·22	4·72	87	265
4	Dun	52·38	2·99	80	300
5	Garton	49·25	3·12	69	220
6	Garton's Yielder	39·54	3·25	24	91
7	Algerian	49·19	3·25	155	470
8	Triumph	61·96	3·38	60	159
9	Danish	66·41	2·43	63	180

Mr. J. Macpherson reports: No. 1 plot yielded better per acre than any of the others; a useful oat. The wet season favoured both No. 2 as well as Sparrowbill. In ordinary dry seasons they have not yielded well in this district. No. 3 grew very well all through the season. No. 4 always does better when sown in autumn and fed off and then allowed to grow into a crop to be harvested. The well-known Garton did not do so well as expected. Garton's Yielder (seed imported) did not braird well at all; only about one-fourth of the seed sown germinated. I purpose sowing the yield from the tenth-acre this season to see how it turns out after the seed has become acclimatized. Like the Dun, Algerian does better when sown in autumn than in spring. It ripened earlier than any of the others. Triumph did not germinate well, but what grew came away vigorously, and yielded well. For many years Danish was the principal variety grown in this district until supplanted by the Gartons. Although rather thin on the ground, it yielded well.

Variety Test, conducted by Angus Ross, Herbert.

The land is light but cold, having a sticky clay subsoil. In turnips in 1908 and 1909; in oats in 1910 and 1911. Ploughed 5 in. deep on 3rd Juue, 1911; grubbed six times on 30th September, 1911; ploughed on 9th September, 1911; disc-harrowed on 30th September, 1911; seed drilled in on 2nd October, 1911; crop tine-harrowed on 2nd October, 1911. Eight varieties were sown in tenth-of-acre plots, the seeding being at the rate of 3 bushels per acre. Results :—

Plot.	Variety.	Grain Yield per Acre.	Yield per Acre if chaffed.	Per Square Yard.	
				Plants.	Stalks.
		Bushels.	Tons.		
1	Yielder	66·06	4·18	112	252
2	Storm King	56·41	3·91	104	211
3	Sparrowbill	49·83	5·40	163	405
4	Dun	38·19	5·40	251	727
5	Garton	71·38	4·32	83	217
6	Garton's Yielder (imported seed) ..	27·61	4·05	57	167
7	Triumph	57·48	4·05	80	186
8	Danish	52·41	5·67	204	456

Inspector Taylor, Oamaru, reports: Good weather prevailed for some time, and all varieties brairded well and evenly excepting plot No. 6, Garton's Yielder (seed imported). Heavy rains were experienced. Rust appeared rather badly during December, the varieties showing this disease more being plots 1, 2, 8, and 9, the others not being so badly affected. The grain was harvested early in January, 1912. The order of ripening was—Plot 4 (Dun), plot 9 (Danish), plots 2 and 3 (Storm King and Sparrowbill); then came 1, 5, 6, and 8 altogether. The season was not favourable—too many cold rains and not enough sunshine. Plots 1 and 2 were somewhat spoiled when in the stook, owing to depredations of geese. Plot 6 made a poor showing throughout.

PALMERSTON SOUTH DISTRICT.

Variety Test of Oats, conducted by John Douglas, Mount Royal, Palmerston South.

The land is a clayey loam with gravelly subsoil. It was in English grass from 1906 to 1909; in oats in 1910; ploughed 7 in. deep on 12th April, 1911; tine-harrowed twice on 10th August; ploughed 8 in. deep on 11th August; tine-harrowed three times on 28th; and oats drilled in and tine-harrowed on 29th. Seeded, with no manure, 3 bushels to the acre. Plots one-tenth acre each. Harvested from 1st to 26th February, 1912. Results:—

Plot.	Variety.	Grain Yield per Acre.	Yield per Acre if chaffed.	Per Square Yard.	
				Plants.	Stalks.
		Bushels.	Tons.		
1	Yielder	42·79	3·51	120	124
2	Storm King	63·44	3·64	110	114
3	Sparrowbill	43·15	5·80	238	252
4	Dun	45·36	4·44	234	434
5	Garton	41·33	4.32	180	223
6	Garton's Yielder (imported seed) ..	25·20	1·89	39	44
7	Algerian	35·48	4·18	218	420
8	Triumph	66·14	6·21	178	198
9	Danish	77·44	5·13	212	257

Inspector Dalgleish, Palmerston South, reports: All the varieties brairded well except No. 6 (imported seed). There being a good rainfall, all plots made good growth by November. At end of January several plots were affected with smut and rust (the seed had not been pickled). Sparrowbills was the most badly affected. Algerian was the only variety quite free of rust and smut. With the exception of plots 4, 7, and 9, all plots stood well despite the wet weather previous to harvesting.

LAWRENCE DISTRICT.

Manurial Test, conducted by J. W. Gent, Greenfield.

The plots were laid out in the clayey loam with a free clay subsoil, the soil being as uniform as possible. The land was in English grasses for ten years to 1909, when it was broken up and sown with turnips; it was in wheat in 1910. For the test plots it was ploughed on 1st June, 1911; cultivated twice and tine-harrowed twice on 1st September. Seed (3 bushels of Triumph oats per acre) was drilled in on 4th October, and harrowed the same day: excellent seed-bed. The plots, one-tenth acre each, were harvested on 18th April, 1912. Results:—

Plot.	Manures per Acre.	Cost of Manure per Acre.	Grain Yield per Acre.	Effect of Manuring.	Yield per Acre if chaffed.	Per Square Yard.	
						Plants.	Stalks.
		s. d.	Bush.	Bushels.	Tons.		
1	Superphosphate, ½ cwt. ..	2 4½	70·12	Loss, 15·47	5·2	224	228
2	Superphosphate, 1 cwt. ..	4 9	85·25	,, 0·34	6·48	220	223
3	No manure	..	85·59	..	5·53	246	247
4	Superphosphate, 1 cwt.; nitrate of soda, ¼ cwt.; seed gypsum, ¼ cwt.	9 3¾	83·18	Loss, 2·41 ,,	6·61	240	242
5	Superphosphate, 1 cwt.; sulphate potash, ¼ cwt.; seed gypsum, ¼ cwt.	9 0¾	90·06	Gain, 4·47	5·4	207	210

Inspector Barron, Lawrence, reports: Owing to heavy rains and wind, grain considerably knocked about. All plots, however, were well headed, and in the end gave fine results. The Triumph oat apparently suits this district.

Variety Test, conducted by J. W. Gent, Greenfield.

The remarks as to soil and preparation in connection with the manurial test apply here. No manure was applied to the first plot, but the others received a dressing of 1¼ cwt. of "Challenge" manure, costing 6s. 10½d. per acre. Harvested from 14th to 22nd March with exception of Triumph, which was harvested on 12th April, 1912. Results:—

Plot.	Variety.	Grain Yield per Acre.	Yield per Acre if chaffed.	Per Square Yard.	
				Plants.	Stalks.
		Bushels.	Tons.		
1	Yielder	77·34	6·48	245	248
2	Storm King	56·37	5·2	121	197
3	Sparrow Bill	63·92	4·05	250	252
4	Dun	66·68	5·4	317	592
5	Garton	Stolen	4·59	220	257
6	Algerian	43·31	4·05	338	470
7	Triumph	69·42	3·78	330	335
8	Danish	70·46	4·59	235	258

Inspector Barron, Lawrence, reports: Plot 1: Nice thickness, straw heavy, slightly shaken to extent of ½ bushel an acre; average length of straw, 3 ft. 3 in. Plot 2: On thin side; straw heavy and brittle; average length, 3 ft. 3 in. Plot 3: Ripened fairly evenly; length, 3 ft. 10 in. Plot 4: Nice crop, slightly leaning; average length, 3 ft. 10 in. Plot 5: Nice crop, standing up well; ripened fairly evenly; after threshing, oats went astray; average length, 3 ft. 10 in. Plot 6: Shaken to extent of 2 to 3 bushels per acre; short and fine in straw, weak at roots; length, 3 ft. Plot 7: Well-headed straw, kneed a good deal; average length, 4 ft. 3 in. Plot 8: Nice crop, slightly leaned, length of straw, 4 ft.; harvested under very adverse weather-conditions.

BALCLUTHA DISTRICT.

Manurial Test, conducted by H. E. Pitt, Greenfield.

The plots were on sharp loam on shingle. For six years up to 1910 it was in English grasses; it was then broken up and put in turnips. On 5th September of last year it was ploughed 5 in. deep; cultivated and tine-harrowed on 9th, and the seed sown and tine-harrowed on 14th. The Garton variety was sown in plots one-tenth acre each. Harvested 16th February to 1st March, 1912. Results:—

Plot.	Manures per Acre.	Cost of Manure per Acre.	Grain Yield per Acre.	Effect of Manuring.	Yield per Acre if chaffed.	Per Square Yard.	
						Plants.	Stalks.
		s. d.	Bush.	Bushels.	Tons.		
1	Superphosphate, ½ cwt. ..	2 4½	100·29	Gain, 17·40	4·32	220	250
2	Superphosphate, 1 cwt. ..	4 9	102·86	„ 19·97	4·45	210	288
3	No manure	..	82·89	..	2·70	154	186
4	Superphosphate, 1 cwt.; nitrate of soda, ¼ cwt.; seed gypsum, ¼ cwt.	9 3¾	108·0	Gain, 25·11	4·86	226	236
5	Superphosphate, ½ cwt.; sulphate potash, ¼ cwt.; seed gypsum, ¼ cwt.	9 0¾	100·5	„ 17·61	4·32	250	282

MR. PITT reports: This most interesting test was well worth the trouble spent on it. The plots were in amongst my own Gartons, and were surrounded by them. Each manured plot showed unmistakable signs of the manure used. The most prominent were Nos. 2 and 4. This continued right throughout the period of growth until the grain ripened. There were only two or three day's difference in ripening between my own

unmanured and the manured tests. Where the manure was used, the stalks, although a little thicker in numbers, did not appear to be better than the unmanured, and it was not until the heads appeared that you could see a distinct difference in quantity. The heads, too, were much finer in appearance, while the grain was well matured in the manured plots. Superphosphate decidedly increased all my yields. Small birds were conspicuous by their absence.

Variety Test, conducted by H. E. Pitt, Greenfield.

The land was the same and the treatment similar to that employed for the manurial experiment. It was manured to the extent of 1 cwt. per acre of Mount Lyell superphosphate, costing at the rate of 6s. per acre. The grain was harvested from 16th February to 1st March, 1912. Results :—

Plot.	Variety.	Grain Yield per Acre.	Yield per Acre if chaffed.	Per Square Yard.	
				Plants.	Stalks.
		Bushels.	Tons.		
1	Garton	97·72	4·45	304	475
2	Algerian	64·29	3·51	289	524
3	Black Excelsior	90·0	3·51	250	344
4	Danish	95·14	2·99	248	258
5	Black Tartarian	56·57	4·32	291	487

Mr. Pitt reports : The Gartons and Danish came away very quickly, and continued so right through their growth. The Algerians came up very straggly, but stooled out well, but for all that allowed the weeds to forge ahead. This oat appears to be of little use for spring sowing. The Algerians and Black Excelsior were the first to ripen, one week elapsing between Algerians, Excelsior, Danish, and Black Tartarian. The Excelsior makes very coarse straw and is unsuitable for chaffing ; it is also easily shaken.

Manurial Test, conducted by H. Snushall, Clydevale.

The land employed for the tests is a sandy loam. It was in lea in 1906 and 1907 ; in turnips in 1908 and 1909 ; in rape in 1910; it was ploughed on 10th May, 1911 ; double-disced on 7th September ; tine-harrowed on 16th September. Oats drilled in (Universal variety, 3 bushels per acre) in one-tenth-acre plots, and tine-harrowed on 20th September, 1911. Harvested on 28th and 29th March, 1912. Results :—

Plot.	Manures per Acre.	Cost of Manure per Acre.	Grain Yield per Acre.	Effect of Manuring.	Yield per Acre if chaffed.	Per Square Yard.	
						Plants.	Stalks.
		s. d.	Bush.	Bushels.	Tons.		
1	Superphosphate, ½ cwt. ..	2 4½	113·13	Gain, 3·77	5·12	213	426
2	Superphosphate, 1 cwt. ..	4 9	113·13	„ 3·77	5·94	114	430
3	No manure	..	109·36	..	4·45	184	364
4	Superphosphate, 1 cwt. ; nitrate of soda, ¼ cwt. ; seed gypsum, ¼ cwt.	9 3¾	118·79	„ 9·43	5·66	116	320
5	Superphosphate, 1 cwt. ; sulphate potash, ¼ cwt. ; seed gypsum, ¼ cwt.	9 0¾	116·90	„ 7·54	5·25	140	385

Mr. Snushall reports : Nos. 1 and 2 did not ripen so early as Nos. 4 and 5. No. 4 was perhaps a little the earliest. Nos. 4 and 5 ripened five days before Nos. 1 and 2, which, however, were ripe seven or eight days before No. 3. No. 1 was cut about ripe. Nos. 4 and 5 had lost a few grains by being shaken. No. 3 was cut just at the right time. The oats were sown somewhat thinly, and did not stool out like some other varieties ; for this reason the yield suffered somewhat. The Universal stands the wind well, and suits this district.

Variety Test, conducted by H. Snushall, Clydevale.

Nature of land and preparation was the same as for the manurial test. Manured with Burnside special grain-manure, 1½ cwt., at a cost of 10s. 6d. per acre. Harvested on 28th and 29th March. Results:—

Plot.	Variety.	Grain Yield per Acre.	Yield per Acre if chaffed.	Per Square Yard.	
				Plants.	Stalks.
		Bushels.	Tons.		
1	Banner	145·19	7·28	275	420
2	Garton	124·44	6·74	318	493
3	Algerian	143·30	3·91	610	796
4	Black Tartarian	75·42	4·04	238	517
5	Black Excelsior	118·79	4·71	359	529
6	Danish	128·22	6·61	231	384
7	Triumph	124·44	5·79	421	440

Mr. Snushall reports: Banner grew well from the start; it came up early, stooled out strongly, and made vigorous growth all the season; it stood up well, all the heads ripened evenly and formed a solid mass. The yield was even greater than anticipated. Garton's Abundance came up fairly thick, but looked yellow and sickly up till near harvest, when it improved rapidly. Algerian came up well and presented an excellent appearance all the season. It grew thick with fine straw, and was about the first to ripen. The yield was exceptional. Black Tartarian came up almost too thickly, and looked as if it would prove the best. Apparently, however, by reason of its thick growth, a large proportion of the heads failed to mature. Black Excelsior came up early and well. It always had a healthy appearance. It ripened about the same time as Algerian. The straw was very stout, but the grain was easily blown out, otherwise the yield would have been better. Danish did very well at first; it ripened late, and the quality of the grain was disappointing. Triumph was the grossest grower, the straw reaching a height of 7 ft. It would be a good variety for feeding off. Stands the wind well here. A hardy oat, but grain gross in quality.

ANALYSES OF MANURES.

Following are the analyses of the manures employed in the above grain experiments: Superphosphate, 17 per cent. phosphoric anhydride, soluble; bonedust, 3 per cent. nitrogen, 23 per cent. phosphoric anhydride; potassium-sulphate, 52 per cent. di-potassic oxide (potash); sodium-nitrate, 15·3 per cent. soluble nitrogen.

POTATO EXPERIMENTS.

KAIKOURA DISTRICT.

Manurial and Spraying Test, conducted by Henry Mackle, Kaikoura Suburban.

The land selected for the experiment was a loam, and was in virgin state up to 1910, when broken up and sown with swede turnips, no fertilizer being used. It was lightly ploughed on 4th September, 1911, disc and tine harrowed on 14th and 15th September, and rolled on 21st September, ploughed very deep on 22nd September, and disc and tine harrowed to a fine mould on 23rd September. The area chosen was divided into five manurial plots and one unmanured plot of one-fortieth acre each, the soil being uniform in character. The fertilizers used were according to a formula designed by the Chief Agricultural Chemist. The variety of potatoes used was Up-to-date. On account of some of the tubers being on the big side, these were cut. The sets were planted on the flat in rows, 28 in. apart and 12 in. between each set in the row. The manures were applied and the potatoes planted on 14th October, 1911. The spraying tests were carried out under the direction of Mr. Courtier, the

Orchard Instructor for Canterbury. One-half of each plot was sprayed with Bordeaux mixture on 12th and 26th January and 12th February, 1912. Intercultivation was given during the early growth of the plants, and in December the crop was earthed up. Owing to an excess of moisture after planting, most of the tubers which were cut into sets perished. The season throughout was fairly damp and conducive to disease. No "late blight" was observable. The potato-tops on the sprayed plots remained green for a considerably longer period than the unsprayed, the leaves and stalks being more robust. The potatoes were dug, classified, and weighed at beginning of April, 1912. For results, see Table 1, page 315.

RANGIORA DISTRICT.

Manurial and Spraying Tests conducted by W. Davis, North Road, Amberley.

The land selected for the experiment was a light loam on a shingly subsoil. It had been in grass for five years prior to being broken up in July, 1911, for this experiment. Ploughed 6 in. deep on 21st August; disc-harrowed and ploughed on 22nd August; tine-harrowed on 25th August; rolled on 28th August; disc-harrowed on 2nd September; tine-harrowed on 4th September; disc-harrowed on 21st September; tine-harrowed on 26th September; rolled on 27th September; ploughed deep; disc-harrowed and tine-harrowed on 9th October, 1911. The area chosen was divided into six plots of one-fortieth acre each, five of which were manured with fertilizers according to a scheme designed by Mr. B. C. Aston, Chief Agricultural Chemist, and one plot was unmanured. The soil in the plots was uniform in character. The variety of seed used was Up-to-date. The sets, with the exception of some large ones which were cut, were planted whole, 12 in. apart in raised drills 36 in. wide. The manures were applied and the potatoes planted on 11th October, 1911. Intercultivation was given at intervals. The spraying tests were carried out under the direction of the Orchard Instructor for Canterbury. One-half of each plot was sprayed three times at intervals of about fourteen days, beginning 2nd February, 1912. The season was wet and cold, consequently not conducive to successful potato-growing. The crop suffered through an excess of rain-water in places throughout the area; this accounts for some of the results in plots in the sprayed area being so low in yield. The crop was free from disease. The potatoes were dug, classified, and weighed the first week in April, 1912. For results, see Table 2, page 316.

Manurial and Spraying Tests conducted at Rangiora High School by the Agricultural Class in Charge of Mr. S. A. Clark, B.A., Assistant Master.

The tests were carried out on the school experimental area, the soil being a rich loam. Prior to the experiment the land had been for a number of years in grass. It was ploughed up in May, 1911, and dug over in September following. The soil in the area selected for the tests was uniform in character, and was divided into six plots, five of which were manured with fertilizers according to a scheme designed by the Chief Agricultural Chemist, and one plot was unmanured. The seed used was Up-to-date. The manures were applied and the potatoes planted on 3rd November, 1911. The spraying tests were begun when the haulms were about 1 ft. in height, three sprayings being given at intervals of about fourteen days. Intercultivation was given during the early growth of the plants, and the crop was finally earthed up. The crop was free from fungoid disease, and was dug up, classified, and weighed at end of March, 1912. For results, see Table 3, page 317.

Variety Test conducted by the Canterbury Frozen Meat Company (Limited), Belfast.

The land selected for the experiment was a clayey loam on a clay subsoil. It was in grass for three years prior to 1910, when it was ploughed up and a potato crop taken. For the experiment under review it was ploughed on 1st August, 1911; rolled on 2nd August; disc-harrowed and tine-harrowed on 5th August; ploughed on 17th August; tine-harrowed on 22nd and 30th August; rolled on 2nd September; ploughed on 15th September; tine-harrowed on 19th September, 1911. Four varieties of potatoes were planted, on 1st November, 1911, in rows 3 ft. apart. The plots were top-dressed with lime at the rate of 15 cwt. per acre, and were manured with Belfast root-manure at the rate of 3 cwt. per acre. Intercultivation was given at short intervals during the growth of the plants, which were eventually earthed up. The spraying tests were carried out under the direction of Inspector Hughes, Rangiora, these being done at intervals of fourteen days on three occasions. The crop was free from "late blight." A small

percentage of the tubers, however, were unsound on account of the wet season and partial flooding in parts with water. The sprayed portion of the plots suffered most from this, being slightly lower in level than the unsprayed part. Beauty of Hebron did not do well, was soft, and was badly affected by the cold, wet weather-conditions during growth. The same remarks apply to Robin Adair. Dalmeny Acme had the greatest growth of haulms, but the yield was disappointing. Up-to-date proved the best, being a very fair crop with few unsound tubers. For results, see Table 4, page 318.

WAIMATE DISTRICT.

Manurial and Spraying Tests conducted by W. Stewart, Waimate.

The land selected was a sandy loam on a clay subsoil, and was in grass for some years prior to being ploughed up in March, 1911, for present experiment. It was tine-harrowed on 31st March, ploughed on 6th June, disc-harrowed on 10th June, ploughed and tine-harrowed (three strokes) on 16th October, 1911. The area was divided into five manurial plots and one unmanured plot, of one-fortieth acre each. The fertilizers used were according to a scheme designed by the Chief Agricultural Chemist. The soil in the plots was uniform in character. The variety of seed used was Up-to-date. The manures were applied and the sets planted on 17th October, 1911—drills 36 in. wide and sets 14 in. apart in the row. The drills were rolled on day of planting. Intercultivation was given at intervals. The spraying tests were carried out under the direction of the Orchard Instructor for Otago on 8th January and 13th February, 1912. The potatoes were dug, classified, and weighed at end of March, 1912. For results, see Table 5, page 319.

Inspector Macdonald reports: At time of digging the healthy appearance and green stems in the sprayed portion was noticeable in contrast with the unhealthy appearance of the unsprayed plots. Frosts had somewhat marred the crop throughout. The quality of the tubers in the sprayed area, together with the results, was decidedly marked.

KUROW DISTRICT.

Manurial and Spraying Tests conducted at the Special School for Boys, Otekaike.

The land selected was a light free loam on a clay and gravelly subsoil. It was in English grasses for five years; ploughed in December, 1910, and planted in cabbage; ploughed for present experiment on 4th September, 1911; disc-harrowed (four strokes) on 8th September; tine-harrowed (four strokes) on 10th September; disc-harrowed twice and tine-harrowed (three strokes) on 20th October, 1911. The area chosen was divided into five manurial plots and one unmanured plot of one-fortieth acre each. The fertilizers applied were according to a formula designed by the Chief Agricultural Chemist. The variety of seed used was Up-to-date. In plot 1 the tubers were cut into sets and limed. In all other plots they were planted whole, in drills 36 in. apart and 15 in. between each in the row. The manures were applied and the potatoes planted on 18th November, 1911. Intercultivation was given during growth of plant. The crop was sprayed with Bordeaux mixture on 12th January and 20th February, 1912. The crop was dug, classified, and weighed on 13th May, 1912. For results, see Table 6, page 320.

Inspector Reid reports: The crop was free from disease. When harvested the shaws on the sprayed portion were greener than those on the unsprayed portion. Unfortunately, the sprayed plots were growing near a high plantation, which no doubt interfered with their growth and affected the yield. The unsprayed plots, being further away from the plantation, got both sun and moisture. The majority of the cut sets, dipped in lime and planted in No. 1 plot, rotted away, resulting in that plot giving a poor return.

OAMARU DISTRICT.

Manurial and Spraying Tests conducted by the Agricultural Class, Waitaki Boys' High School, Oamaru.

The land selected for the experiment was light and of poor quality, with a clay subsoil. It was in grass for some years prior to 1910, when it was ploughed up and cropped with mangels and turnips. It was ploughed in August, tine-harrowed in September, and dug over by the class on 17th October, 1911. The area chosen was divided into five manurial plots, one limed plot, and one unmanured plot, of one-twentieth

acre each. The fertilizers applied were according to a formula designed by the Chief Agricultural Chemist. Up-to-date potatoes were planted on the flat, in rows 36 in. apart, and the sets 12 in. between in the row. The manures were applied and the potatoes planted on 17th October, 1911. Intercultivation was given during the early growth of the crop, and in December the crop was earthed up. The crop was sprayed with Bordeaux mixture on 5th January, 5th February, and 13th March, 1912. The crop was dug, classified, and weighed on 23rd April, 1912. For results, see Table 7, page 321.

Inspector Taylor reports: No blight of any kind affected either the sprayed or unsprayed plots. The tubers when dug were nice and clean, of good growth, and free from disease. The sprayed plots lost their shaws or haulms somewhat earlier than the others.

The fact of the sprayed plots losing their shaws earlier than the unsprayed plots indicates that either the materials of which the Bordeaux mixture was made were not true to name or that the liquids had not been properly mixed and applied.

Manurial Test conducted by A. H. Copland, Ardgowan, Weston.

The land chosen for the experiment was a clayey loam on a clay subsoil. It was in grass for some years prior to being broken up in February, 1911, for purpose of this experiment. Disc-harrowed twice in April, 1911; tine-harrowed (two strokes) on 2nd May; cultivated three times and ploughed on 31st August; tine-harrowed (four strokes) on 30th September, 1911. The area selected was divided into five manurial plots and one unmanured plot of one-fortieth acre each. The fertilizers used were according to a formula designed by the Chief Agricultural Chemist. The variety of potato used was Up-to-date. The sets were planted in drills 36 in. apart and 12 in. between each set in the row. The manures were applied and potatoes planted on 5th October, 1911. The drills were harrowed down on 13th November, 1911. Intercultivation was given at intervals until the crop was earthed up in December. The plots were sprayed once on 4th January, 1912, and were free from "late blight," the haulms remaining green until dug, whereas a field of potatoes adjoining, which had not been sprayed, was badly affected. The crop was dug, classified, and weighed in April, 1912. For results, see Table 8, page 322.

ANALYSES OF MANURES.

Analyses of manures employed in potato experiments:—Superphosphate contained 16·5 per cent. soluble phosphoric anhydride and 1·3 per cent. insoluble phosphoric anhydride. Bonedust, 3·9 per cent. insoluble nitrogen and 25·25 per cent. insoluble phosphoric anhydride. Dried blood, 12·75 per cent. insoluble nitrogen and 1·5 per cent. insoluble phosphoric anhydride. Sulphate of potash, 52 per cent. di-potassic oxide (potash). Sulphate of ammonia, 20·6 per cent. soluble nitrogen.

Weight of each ingredient applied in pounds per acre:—

Plot.	Nitrogen.		Phosphoric Anhydride.		Potash.
	Soluble.	Insoluble.	Soluble.	Insoluble.	Soluble.
1	..	6·5	37·0	38·6	..
2	..	28·0	37·0	40·8	..
3	..	28·0	37·0	40·8	58·24
4	..	..	..	..	..
5	17·36	6·5	37·0	38·6	58·24
6	..	..	73·9	5·8	..

TABLE I.

Plot.	Manures, per Acre.	Cost per Acre.	Classification of Tubers.	Manurial Test.		Spraying Test.			
				Yield per Acre.	Gain or Loss by Fertilization.	Yield per Acre.		Gain or Loss per Acre compared with Unsprayed Area.	Gain or Loss per Acre, "Marketable, Sound," in Sprayed Area.
						Unsprayed.	Sprayed.		
		£ s. d.		Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.	0 18 6	Marketable size, sound	8·65	..	8·65	9·60¼	..	Gain 0·95
			Small unmarketable size, sound ..	2·68	..	2·68	3·38	..	..
			,, unsound..	0·79	..	0·79	0·50	..	..
				12·12	Gain 7·65	12·12	13·48	Gain 1·36	..
2	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.; dried blood, 1½ cwt.	1 9 0	Marketable size, sound	4·55	..	4·55	5·18	..	Gain 0·63
			Small unmarketable size, sound ..	1·35	..	1·35	1·61	..	..
			,, unsound..	0·63	..	0·63	0·56	..	..
				6·53	Gain 2·06	6·53	7·35	Gain 0·82	..
3	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.; dried blood, 1½ cwt.; sulph. of potash, 1 cwt.	2 4 0	Marketable size, sound	5·34	..	5·34	12·51	..	Gain 7·17
			Small unmarketable size, sound ..	1·45	..	1·45	2·78	..	..
			,, unsound..	0·63	..	0·63	1·13	..	..
				7·42	Gain 2·95	7·42	16·42	Gain 9·0	..
4	No manure	..	Marketable size, sound	2·71	..	2·71	6·76	..	Gain 4·05
			Small unmarketable size, sound ..	0·63	..	0·63	1·58	..	..
			,, unsound..	1·13	..	1·13	0·88	..	..
				4·47	..	4·47	9·22	Gain 4·75	..
5	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.; sulph. of ammonia, ¾ cwt.; sulph. of potash, 1 cwt.	2 6 3	Marketable size, sound	4·58	..	4·58	8·97	..	Gain 4·39
			Small unmarketable size, sound ..	1·80	..	1·80	2·46	..	..
			,, unsound..	1·70	..	1·70	0·91	..	..
				8·08	Gain 3·61	8·08	12·34	Gain 4·26	..
6	Superphosphate, 4 cwt. ..	0 19 0	Marketable size, sound	7·14	..	7·14	10·17	..	Gain 3·03
			Small unmarketable size, sound ..	2·37	..	2·37	3·16	..	..
			,, unsound..	1·16	..	1·16	0·82	..	..
				10·67	Gain 6·20	10·67	14·15	Gain 3·48	..

TABLE 2.

Plot.	Manures, per Acre.	Cost per Acre.	Classification of Tubers.	Manurial Test.		Spraying Test.			
				Yield per Acre.	Gain or Loss by Fertilization.	Yield per Acre.		Gain or Loss per Acre compared with Unsprayed Area.	Gain or Loss per Acre, "Marketable, Sound," in Sprayed Area.
						Unsprayed.	Sprayed.		
		£ s. d.		Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.	0 18 0	Marketable size, sound	7·85	..	7·85	8·15	..	Gain 0·30
			Small unmarketable size, sound ..	4·32	..	4·32	3·04	..	..
				12·17	Gain 1·38	12·17	11·19	Loss 0·98	..
2	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.; dried blood, 1½ cwt.	1 9 0	Marketable size, sound	6·38	..	6·38	8·05	..	Gain 1·67
			Small unmarketable size, sound ..	5·59	..	5·59	2·65	..	..
				11·97	Gain 1·18	11·97	10·70	Loss 1·27	..
3	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.; dried blood, 1½ cwt.; sulph. of potash, 1 cwt.	2 4 0	Marketable size, sound	8·74	..	8·74	8·24	..	Loss 0·50
			Small unmarketable size, sound ..	4·61	..	4·61	4·71	..	..
				13·35	Gain 2·56	13·35	12·95	Loss 0·40	..
4	No manure	..	Marketable size, sound	6·38	..	6·38	4·91	..	Loss 1·47
			Small unmarketable size, sound ..	4·41	..	4·41	5·00	..	..
				10·79	..	10·79	9·91	Loss 0·88	..
5	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.; sulph. of ammonia, ¾ cwt.; sulph. of potash, 1 cwt.	2 6 3	Marketable size, sound	10·01	..	10·01	9·03	..	Loss 0·98
			Small unmarketable size, sound ..	4·62	..	4·62	4·41	..	..
				14·63	Gain 3·84	14·63	13·44	Loss 1·19	..
6	Superphosphate, 4 cwt. ..	0 19 0	Marketable size, sound	10·80	..	10·80	9·91	..	Loss 0·89
			Small unmarketable size, sound ..	3·43	..	3·43	4·12	..	..
				14·23	Gain 3·44	14·23	14·03	Loss 0·20	..

TABLE 3.

Plot.	Manures, per Acre.	Cost per Acre.	Classification of Tubers.	Manurial Test.		Spraying Test.			
				Yield per Acre.	Gain or Loss by Fertilization.	Yield per Acre.		Gain or Loss per Acre compared with Unsprayed Area.	Gain or Loss per Acre, "Marketable, Sound," in Sprayed Area.
						Unsprayed.	Sprayed.		
		£ s. d.		Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1	Superphosphate, 2 cwt.; bonedust, 1½ cwt.	0 18 0	Marketable size, sound	8·86	..	8·86	9·33	..	Gain 0·47
			Small unmarketable size, sound ..	4·44	..	4·44	7·00	..	..
				13·30	Gain 4·04	13·30	16·33	Gain 3·03	..
2	Superphosphate, 2 cwt.; bonedust, 1½ cwt.; dried blood, 1½ cwt.	1 9 0	Marketable size, sound	8·86	..	8·86	11·43	..	Gain 2·57
			Small unmarketable size, sound ..	4·19	..	4·19	4·55	..	..
				13·05	Gain 3·79	13·05	15·98	Gain 2·93	..
3	Superphosphate, 2 cwt.; bonedust, 1½ cwt.; dried blood, 1½ cwt.; sulph. of potash, 1 cwt.	2 4 0	Marketable size, sound	13·06	..	13·06	14·00	..	Gain 0·94
			Small unmarketable size, sound ..	4·31	..	4·31	4·04	..	..
				17·37	Gain 8·11	17·37	18·04	Gain 0·67	..
4	No manure	..	Marketable size, sound	3·73	..	3·73	5·60	..	Gain 1·87
			Small unmarketable size, sound ..	5·53	..	5·53	4·20	..	..
				9·26	..	9·26	9·80	Gain 0·54	..
5	Superphosphate, 2 cwt.; bonedust, 1½ cwt.; sulph. of ammonia, ¾ cwt.; sulph. of potash, 1 cwt.	2 6 3	Marketable size, sound	9·09	..	9·09	11·67	..	Gain 2·58
			Small unmarketable size, sound ..	4·43	..	4·43	3·06	..	..
				13·52	Gain 4·26	13·52	14·73	Gain 1·21	..
6	Superphosphate, 4 cwt. ..	0 19 0	Marketable size, sound	5·60	..	5·60	7·93	..	Gain 2·33
			Small unmarketable size, sound ..	5·13	..	5·13	6·22	..	..
				10·73	Gain 1·47	10·73	14·15	Gain 3·42	..

TABLE 4.

Plot.	Variety.	Classification of Tubers.	Spraying Test.			
			Yield per Acre.		Effect of Spraying, Gain or Loss per Acre.	Gain or Loss per Acre, "Marketable, Sound," through Spraying.
			Unsprayed.	Sprayed.		
			Tons.	Tons.	Tons.	Tons.
1	Beauty of Hebron	Marketable size, sound	1·32	1·57	..	Gain 0·25
		Small unmarketable size, sound	2·65	2·06	..	..
		„ unsound	0·29	0·44	..	..
			4·26	4·07	Loss 0·19	..
2	Robin Adair	Marketable size, sound	4·76	4·02	..	Loss 0·74
		Small unmarketable size, sound	2·98	2·84	..	..
		„ unsound	0·45	0·39	..	..
			8·19	7·25	Loss 0·94	..
3	Dalmeny Acme..	Marketable size, sound	6·67	8·76	..	Gain 2·09
		Small unmarketable size, sound	3·92	2·98	..	..
		„ unsound	0·31	0·39	..	..
			10·90	12·13	Gain 1·23	..
4	Up-to-date	Marketable size, sound	10·48	11·74	..	Gain 1·26
		Small unmarketable size, sound	2·67	1·80	..	..
		„ unsound	0·07	0·07	..	..
			13·22	13·61	Gain 0·39	..

TABLE 5.

Plot.	Manures, per Acre.	Cost per Acre.	Classification of Tubers.	Manurial Test.		Spraying Test.			
				Yield per Acre.	Gain or Loss by Fertilization.	Yield per Acre.		Gain or Loss per Acre compared with Unsprayed Area.	Gain or Loss per Acre, "Marketable, Sound," in Sprayed Area.
						Unsprayed.	Sprayed.		
		£ s. d.		Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.	0 18 0	Marketable size, sound	10·34	..	10·34	12·65	..	Gain 2·31
			Small unmarketable size, sound ..	2·16	..	2·16	2·16	..	..
			Marketable size, unsound ..	1·08	..	1·08	..	..	..
			Small unmarketable size, unsound..	1·08	..	1·08	..	..	..
				14·66	Gain 6·02	14·66	14·81	Gain 0·15	..
2	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.; dried blood, 1½ cwt.	1 9 0	Marketable size, sound	8·79	..	8·79	10·18	..	Gain 1·39
			Small unmarketable size, sound ..	2·00	..	2·00	1·08	..	..
			Marketable size, unsound ..	2·46	..	2·46	..	..	..
			Small unmarketable size, unsound..	2·46	..	2·46	..	..	..
				15·71	Gain 7.07	15·71	11·26	Loss 4·45	..
3	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.; dried blood, 1½ cwt.; sulph. of potash, 1 cwt.	2 4 0	Marketable size, sound	9·56	..	9·56	13·42	..	Gain 3·86
			Small unmarketable size, sound ..	1·54	..	1·54	1·08	..	..
			Marketable size, unsound ..	1·85	..	1·85	..	..	..
			Small unmarketable size, unsound..	1·23	..	1·23	..	..	..
				14·18	Gain 5·54	14·18	14·50	Gain 0·32	..
4	No manure	..	Marketable size, sound	5·40	..	5·40	11·57	..	Gain 6·17
			Small unmarketable size, sound ..	1·08	..	1·08	1·08	..	..
			Marketable size, unsound ..	1·08	..	1·08	..	..	..
			Small unmarketable size, unsound..	1·08	..	1·08	..	..	..
				8·64	..	8·64	12·65	Gain 4·01	..
5	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.; sulph. of ammonia, ¾ cwt.; sulph. of potash, 1 cwt.	2 6 3	Marketable size, sound	10·03	..	10·03	12·96	..	Gain 2·93
			Small unmarketable size, sound ..	1·38	..	1·38	1·23	..	..
			Marketable size, unsound ..	1·38	..	1·38	..	..	..
			Small unmarketable size, unsound..	1·38	..	1·38	..	..	..
				14·17	Gain 5·53	14·17	14·19	Gain 0·02	..
6	Superphosphate, 4 cwt. ..	0 19 0	Marketable size, sound	10·03	..	10·03	11·42	..	Gain 1·39
			Small unmarketable size, sound ..	1·54	..	1·54	2·00	..	..
			Marketable size, unsound ..	1·38	..	1·38	..	..	..
			Small unmarketable size, unsound..	1·38	..	1·38	..	..	..
				14·33	Gain 5·69	14·33	13·42	Loss 0·91	..

TABLE 6.

Plot.	Manures, per Acre.	Cost per Acre.	Classification of Tubers.	Manurial Test.		Spraying Test.			
				Yield per Acre.	Gain or Loss by Fertilization.	Yield per Acre.		Gain or Loss per Acre compared with Unsprayed Area.	Gain or Loss per Acre, "Marketable, Sound," in Sprayed Area.
						Unsprayed.	Sprayed.		
		£ s. d.		Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.	0 18 0	Marketable size, sound	2·00	..	2·00	2·92	..	Gain 0·92
			Small unmarketable size, sound ..	0·57	..	0·57	0·75	..	..
				2·57	Loss 7·13	2·57	3·67	Gain 1·10	..
2	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.; dried blood, 1½ cwt.	1 9 0	Marketable size, sound	10·03	..	10·03	9·07	..	Loss 0·96
			Small unmarketable size, sound ..	1·46	..	1·46	2·32	..	..
				11·49	Gain 1·79	11·49	11·39	Loss 0·10	..
3	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.; dried blood, 1½ cwt.; sulph. of potash, 1 cwt.	2 4 0	Marketable size, sound	9·89	..	9·89	7·96	..	Loss 1·93
			Small unmarketable size, sound ..	0·60	..	0·60	2·03	..	..
				10·49	Gain 0·79	10·49	9·99	Loss 0·50	..
4	No manure	..	Marketable size, sound	8·42	..	8·42	5·42	..	Loss 3·00
			Small unmarketable size, sound ..	1·28	..	1·28	1·07	..	..
				9·70	..	9·70	6·49	Loss 3·21	..
5	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.; sulph. of ammonia, ¾ cwt.; sulph. of potash, 1 cwt.	2 6 3	Marketable size, sound	6·14	..	6·14	5·75	..	Loss 0·39
			Small unmarketable size, sound ..	1·17	..	1·17	1·03	..	..
				7·31	Loss 2·39	7·31	6·78	Loss 0·53	..
6	Superphosphate, 4 cwt. ..	0 19 0	Marketable size, sound	6·35	..	6·35	5·10	..	Loss 1·25
			Small unmarketable size, sound ..	1·42	..	1·42	1 39	..	..
				7·77	Loss 1·93	7·77	6·49	Loss 1·28	..

TABLE 7.

Plot.	Manures, per Acre.	Cost per Acre.	Classification of Tubers.	Manurial Test.		Spraying Test.			
				Yield per Acre.	Gain or Loss by Fertilization.	Yield per Acre.		Gain or Loss per Acre compared with Unsprayed Area.	Gain or Loss per Acre, "Marketable, Sound," in Sprayed Area.
						Unsprayed.	Sprayed.		
		£ s. d.		Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.	0 18 0	Marketable size, sound	8·10	..	8·10	6·75	..	Loss 1·35
			Small unmarketable size, sound ..	0·94	..	0·94	0·54	..	..
				9·04	Gain 3·78	9·04	7·29	Loss 1·75	..
2	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.; dried blood, 1½ cwt.	1 9 0	Marketable size, sound	6·75	..	6·75	6·88	..	Gain 0·13
			Small unmarketable size, sound ..	1·35	..	1·35	1·75	..	..
				8·10	Gain 2·84	8·10	8·63	Gain 0·53	..
3	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.; dried blood, 1½ cwt.; sulph. of potash, 1 cwt.	2 4 0	Marketable size, sound	7·96	..	7·96	6·48	..	Loss 1·48
			Small unmarketable size, sound ..	0·94	..	0·94	4·45	..	..
				8·90	Gain 3·64	8·90	10·93	Gain 2·03	..
4	No manure	..	Marketable size, sound	4·05	..	4·05	5·40	..	Gain 1·35
			Small unmarketable size, sound ..	1·21	..	1·21	0·54	..	..
				5·26	..	5·26	5·94	Gain 0·68	..
5	Superphosphate, 2 cwt.; bone-dust, 1½ cwt.; sulph. of ammonia, ¾ cwt.; sulph. of potash, 1 cwt.	2 6 3	Marketable size, sound	5·53	..	5·53	4·72	..	Loss 0·81
			Small unmarketable size, sound ..	0·81	..	0·81	0·67	..	..
				6·34	Gain 1·08	6·34	5·39	Loss 0·95	..
6	Superphosphate, 4 cwt. ..	0 19 0	Marketable size, sound	5·53	..	5·53	9·72	..	Gain 4·19
			Small unmarketable size, sound ..	1·89	..	1·89	2·16	..	..
				7·42	Gain 2·16	7·42	11·88	Gain 3·76	..
7	Lime, 1½ cwt.	1 10 0	Marketable size, sound	6·61	..	6·61	6·75	..	Gain 0·14
			Small unmarketable size, sound ..	1·48	..	1·48	1·21	..	..
				8·09	Gain 2·83	8·09	7·96	Loss 0·13	..

TABLE 8.

Plot.	Manures per Acre.	Cost per Acre. £ s. d.	Classification of Tubers.	Manurial Test. Yield per Acre.	Manurial Test. Gain by use of Fertilizer.
				Tons.	Tons.
1	Superphosphate, 2 cwt.; bonedust, 1½ cwt. ..	0 18 0	Marketable size, sound	5·94	..
			Small unmarketable size, sound	0·81	..
				6·75	Gain 0·41
2	Superphosphate, 2 cwt.; bonedust, 1½ cwt.; dried blood, 1½ cwt	1 9 0	Marketable size, sound	8·77	..
			Small unmarketable size, sound	0·67	..
				9·44	Gain 3·10
3	Superphosphate, 2 cwt.; bonedust, 1½ cwt.; dried blood, 1½ cwt.; sulph. of potash, 1 cwt.	2 4 0	Marketable size, sound	7·29	..
			Small unmarketable size, sound	1·21	
				8·50	Gain 2·16
4	No manure		Marketable size, sound	3·64	..
			Small unmarketable size, sound	2·70	..
				6·34	..
5	Superphosphate, 2 cwt.; bonedust, 1½ cwt.; sulph. ammonia, ¾ cwt.; sulph. of potash, 1 cwt.	2 6 3	Marketable size, sound	7·96	..
			Small unmarketable size, sound	0·94	..
				8·90	Gain 2·56
6	Superphosphate, 4 cwt.	0 19 0	Marketable size, sound	6·88	
			Small unmarketable size, sound	0·67	..
				7·55	Gain 1·21

PASTURES AND CROPS.

AUGUST.

OFFICERS of the Fields and Experimental Farms Division of the Department report as follows on the condition of the pasture and crops during the past month :—

OHAEAWAI.—August was a cold month, but not as wet as July. Some fine warm days were enjoyed. Everything seems to indicate that spring has now again commenced. Farmers are busy everywhere, and are preparing for sowing oats and other crops. Supplies at the butter-factory are on the increase, and there seem to be prospects of an expanse in the dairy-farming of the north.—*W. J. Dunlop.*

WHANGAREI.—August was fairly wet. There were severe frosts about the middle of the month, but the last days were a little warmer, allowing the grass to make a decided move towards the spring growth.—*A. P. Speedy.*

AUCKLAND.—August commenced with rain, and was a very cold month; it ended with heavy peals of thunder and lightning, followed by a heavy downpour of rain. Frosts also were common during the month, doing good as a purifier of the soil; in other respects they greatly checked the growth of grass on the pasture country. Still, stock did not suffer to any great extent, there being a plentiful supply of green feed, roots, and hay to carry the stock through the boisterous weather. The farmers are beginning to see it pays them to make provisions for winter feed, and as time rolls on other substitutes for winter and spring feed will have to be attended to. Ensilage, for one, will, I think, come into prominence more than at present. Farming operations were not lost sight of during the spell of dry weather; the farmers made every effort to get on with ploughing and other cultivation of their land, which was greatly retarded by the continual spell of wet weather. Top-dressing pastures has been well attended to, so that, when the warm weather sets in, the grass will develop a good growth. Dairy stock are still in perfect condition, and the milk-supply is good.—*R. Rowan.*

TE AROHA.—August was exceptionally dry, with sunny days and severe frosts at nights, consequently pastures shrivelled up. The month closed, however, with a heavy fall of rain, which was badly needed. Thanks to good crops of turnips, stock have wintered well. With the absence of frost, the fall of rain we are experiencing at present will help the pastures along. This month has been the driest, with the most severe frosts, on record for the district.—*J. L. Morris.*

HAMILTON.—The first week in August was extremely wet and cold; the following three weeks fine, bright weather prevailed, and the last day or so was showery. There were several frosts during the month. Most of the turnip crops are eaten off. Pastures, although showing a spring growth, are short; but there should be plenty of feed in two or three weeks' time. Dairy herds are coming to profit, and are in good condition. —*J. Kerr.*

TE AWAMUTU.—The weather during August was very mixed, starting with a week of exceptionally cold and stormy weather, followed by about a fortnight of fine, clear frosty nights and warm days, and winding up with a much-needed warm rain. The new grass has not been a success generally, but the exceptionally good crops of turnips have carried stock well into the spring. Hay has also been in abundance.—*C. E. McPhee.*

CAMBRIDGE.—The past month was fine; there were nice sunny days, though frosts were frequent, which retarded the growth. Only three wet days were experienced during the month; hence farming operations—ploughing and sowing, &c.—have been in full swing. Pastures are fair at present. Thanks to good root crops and an abundant supply of hay, stock generally are looking well.—*A. A. Claycott.*

TE KUITI.—August was fairly fine when compared with the months preceding it. Exceptionally heavy frosts were plentiful, and the few days of rain experienced were of a warmer nature than those of the past rains. Pastures are yet bare, indications of spring being hardly perceptible. Farmers are now busy with field-work, which is backward owing to the past inclement weather.—*B. Bayly.*

GISBORNE.—The weather during August was very unsettled. There was a good deal of frost (for this district) early in the month, with cold and showery weather during the remainder. The pastures are commencing to develop a splendid growth, and there is good prospect of an early spring. Sheep have wintered exceptionally well. Lambing is general at present and gives promise of good percentages.—*William Ross.*

WAIROA.—This district belied not the reputation for the mildness and salubrity of its climate during the first half of the monthly period, the experience approximating to that enjoyed on the subtropical coast of southern Queensland. After the middle of the month the spell was broken with the advent of cold southerly squalls, the ranges in the back country being heavily capped with snow. The last days of the period were showery, milder, and more springlike, bringing forth the green tinge to our first harbinger of spring—the ubiquitous willow.—*T. F. Mullaly.*

PAHIATUA.—The weather in August was most suitable for all farming and station operations. From my own observations, and from what I hear, the lambing is good. Dairy cows are looking well on their coming in, owing to good provision made for them by their owners. Those that make no provision will do well to imitate those who do, for it pays handsomely.—*T. Bacon.*

WAIPUKURAU.—The weather during the past month was very changeable; during the last two weeks, however, the atmosphere has been decidedly warmer, and grass, &c., is making a good spring growth. There should be an abundance of feed for all classes of stock in the near future. As the district is also having a good lambing, farmers should have a very successful season.—*H. O. M. Christie.*

MASTERTON.—During the first week in August we had a severe snowstorm, which caused the death of a number of young lambs; but since then we have had mild weather, with a few showers, and an occasional frost; but on the whole it has been exceptionally good weather. In several parts of the district the grass has assumed a fresh green appearance, this being probably due to the warm rain which has been experienced at intervals during the month. Feed is plentiful for this time of the year, and there is every indication of a record lambing, and stock generally are looking well. Farm-work is going ahead fast, and I anticipate a very large area under crop this year.—*T. C. Webb.*

NORTHERN WAIRARAPA.—The weather-conditions during the past month were ideal. There were fine sunny days with an occasional shower, but also a few frosts, which checked the young grass. If the fine weather continues there will soon be abundance of feed for the young lambs. Stock generally are looking well; the weedy sort are suffering at present, the young grass being too strong for them. Sowing is going on apace, and there has been a lot of ground ploughed and sown within the last month. What was sown previous to the floods is looking healthy.—*J. S. Rankin.*

CARTERTON.—During the first half of the past month the weather was somewhat boisterous and cold. One of the heaviest snowfalls this winter occurred on the 11th, when the lower levels were covered. This, however, was apparently the grand finale of the winter, as since then most favourable weather has prevailed, warm days and practically no frosts resulting in a good early growth everywhere. Ploughing and other tillage-work is being pushed on apace, and general prospects of a favourable season have seldom been more promising than at present.—*S. C. Ivens.*

WELLINGTON.—August showed an almost complete reversal of climatic conditions as compared with July. With the exception of a few mild rains in the early part of the month, August was remarkable for a long spell of mild, dry, windless, beautiful weather, with light night frosts. The rain-soaked lands rapidly dried, pastures and crops felt the touch of spring and rapidly improved, and agricultural work proceeded apace. Losses in young sheep are recorded, but stock generally are already showing the change from the biting cold.—*G. H. Jenkinson.*

NEW PLYMOUTH.—August was a fine spring month, with two or three heavy frosts, followed by light frosts and fine sunny days. Farmers have been able to get on well with their ploughing and other work. Grass has made a decided growth. Cows are in much better condition than usual at this time of the year. The supply of milk to the factories is increasing fast.—*R. E. Fairfax-Cholmeley.*

STRATFORD.—August was fine and frosty, with bright sunshine during the day. On the last three days of the month heavy rain fell. Stock of all kinds are in good order, and have wintered well. Farmers have still large quantities of turnips, hay, and ensilage left. The fine month has enabled the farmers to do a considerable amount of burning, stumping, and ploughing. Prospects are good for the coming season.—*Austin F. Wilson.*

HAWERA.—During the early part of the past month and up to the 28th clear frosty weather predominated. A few frosts about the middle of the month were very severe,

which had the effect of materially checking growth in pastures and vegetation generally. Good rain, however, fell on the 30th, and given a continuance for a week or two of the nice mild weather now prevailing a good spring is assured. Cows are coming in well; dairy factories are now in full swing, and supplies are satisfactory for this time of year. —*A. J. Glasson.*

WANGANUI.—Although several exceptionally hard frosts were experienced, the weather during August was very fine for the season of the year, and in marked contrast to that of the preceding nine months. Bright, warm, sunny days were general, and very little rain fell. Agricultural work was vigorously prosecuted, and considerable arrears of it overtaken, which had previously been compulsorily postponed owing to adverse climatic conditions. Pastures, though showing green, are bare generally; but. given reasonable rainfall, there is every prospect of good early feed.—*C. Watson.*

OHAKUNE.—August commenced with two exceptionally fine days, with heavy frosts at night, the third breaking in cold and wet, and continuing so until the 6th, the weather then decidedly changing for the better. The month ended favourably to agricultural and pastoral pursuits. During the earlier part of the month the cold and frosty weather retarded the growth of pastures, but afterwards a noticeable improvement was perceptible. Dairying is making rapid progress in some parts of the district, and farmers enter into this industry under more systematic lines than have hitherto existed. The milk-supply for town distribution has increased within the month, but up to this period the supply was not equal to the demand. Lambing is fairly general throughout the district, present indications pointing to satisfactory percentages. Rain fell on nine days. —*P. Barry.*

MANGAWEKA.—August commenced with wet weather; then came some exceptionally heavy frosts; but bright warm days followed, and drying winds prevailed. All outdoor work is now proceeding rapidly. Flood waters have disappeared from the paddocks, and roads have dried up beautifully. At time of writing it is raining heavily; this will do an immense amount of good after the dry frosts. Lambing is now general throughout the district.—*J. A. Melrose.*

FEILDING.—The weather during the past month was good. Rain fell on fourteen days; the remaining seventeen days were exceptionally clear, with sharp frosts. Although the cold weather kept a check on the grass and all kinds of fruit-trees, it enabled the teams to be kept busy in getting in the crops for the coming season, and also in preparing land for following crops. Owing to the recent warm rains an early spring is assured, and a good percentage of lambs is being anticipated. Creameries are opened, and dairying is in full swing again. Those who made ensilage and are now feeding it to their newly calved cows are well satisfied with the results, and in some cases are already preparing their land for next season's sowing, and intend growing more extensively, as it is freely expressed ensilage has become the main feature in keeping up the milk-supply at all seasons of the year.—*William Dibble.*

NELSON.—With the exception of a few days at the beginning and the last three days of the month, the weather in August was beautifully fine, there being sunny days and frosty nights. However, the last three days were wet, and the rivers and creeks have been in high flood. The rain will do good by taking the frost out of the ground. Warm weather is now wanted to make the grass and crops grow well, and on account of the lambing.—*Gilbert Ward.*

HOKITIKA.—The past month was very mild. By the appearance of the weather at present there is every indication of an early spring, which will be very beneficial to farmers, who are short of feed for stock.—*H. J. Walton.*

BLENHEIM.—The weather was fine and dry during the past month. The days were beautifully bright and sunny, with hard frosts at most of the nights. Good rain fell on the last day of the month, and was much needed. The weather is now warmer. —*F. H. Brittain.*

SEDDON.—The weather in August was quite exceptional for this district, considering the time of year. A succession of very severe frosts, followed by bright sunny days, continued throughout the month up to the 29th, when a very mild and warm rain started, which has removed all frost that has been lying on the ground these last three weeks. Lambing has started generally, and there is every prospect of a good percentage throughout the lower country.—*E. T. Sinclair.*

ROTHERHAM.—During the first four days of August the weather was a bit showery, but since the 8th we have been experiencing ideal weather from an agricultural and pastoral point of view. Lambing has commenced in a good many parts of the district, and so far there is every prospect of a good lambing on the farming-areas. Feed has come away very fast during the last fortnight, and provided severe frosts keep away, feed will be plentiful by the middle of next month. Farmers are now pushing on with

the work which should have been done in July. Snow is still very deep in the back country, and the loss of stock is reckoned to be a very heavy one.—*W. M. Munro.*

KAIKOURA.—With the exception of one rough stormy day, raining and snowing about the beginning of the month, and rain on the last Saturday, dry weather continued throughout August. A succession of hard frosts occurred. Snow still lies heavy on the higher country, but has thawed considerably the last few days; the swollen rivers are stopping coach communication. Reports regarding the safety of the sheep on the country snowed up last month are not reassuring; a vast number of sheep have perished, but the exact loss will not be known till shearing-time. Farmers on the low country are busy with their spring sowings. Pastures on cultivated lands are bare, there being little growth yet, owing to so much frost.—*William S. Goodall.*

RANGIORA.—August was a beautiful month. The weather was fine, with clear days and frosty nights. There was very little rain. The total sunshine amounted to 187 hours 15 minutes. Frosts occurred on twenty-three days. Pasture is pretty bare in the paddocks, but is holding out well on pastoral country, there being a lot of pickings under the tussocks and where protected from the frost. This should be a good argument for not burning all tussocks the same year, but leaving a portion to protect the grasses that grow under them. Farmers have been very busy preparing land for spring sowing. The ewes are lambing well, and there is every prospect of a heavy percentage of lambs.—*A. Hughes.*

ASHBURTON.—August was an exceptionally fine month. Farmers are at high pressure, some working nine hours a day to get in their white crops, and the seed-bed is now in capital order. There is evidence of spring everywhere: weeping-willows are in leaf, fruit-trees are budding, and a good number of lambs are to be seen. Only 45 points of rain was recorded, as against 38 last year. Frost was registered on several nights, 19 degrees being the highest, as compared with 14 last year.—*C. Branigan.*

TIMARU.—During the month of August there have been some heavy falls of rain, with snow on the downs. The land is very wet, and farmers are badly delayed putting in spring wheat and oats.—*J. C. Huddleston.*

FAIRLIE.—August was a very favourable month. Everything has done well, and there is every indication of an early spring. All stock are looking well, and there have been no losses during the winter in the Mackenzie country. There is a shortage of sheep in this district, and record prices are being obtained for good ewes; some lines have been sold recently at £1 7s. Potatoes are fairly plentiful. Rabbit-poisoning is now in full swing, and very satisfactory results are being obtained.—*W. B. Manning.*

OAMARU.—The past month was all that could be desired from a farmer's point of view, and great headway has been made in sowing, advantage being taken of every hour. There will be a much smaller area in wheat this year in this district, owing to the lateness caused by the rains in June and July. Quite a boom has been going on here in the export of potatoes to the Commonwealth, some thousands of sacks having been shipped during the month. Present conditions are favourable for another good season. Rainfall about 1 in.—*S. M. Taylor.*

WAIMATE.—The unusually wet winter made it impossible for agriculturists to prepare their land for sowing of winter cereals, and it is now evident that the area of winter wheat will be much below the average. The area in oats and spring-sown wheats is expected to be considerable. The past few weeks of genial weather have hastened farm-work along, and sowing of cereals is receiving earnest attention from the farmer. Pastures generally are good, excepting in the smaller paddocks, where a shortness is noticeable, probably owing to overstocking. Turnips have been more plentiful than usual, which has done much to assist stock, which the adverse weather has tended to keep backward. Much of last season's grain is still in the stack; spring threshing has commenced, and it is also evident that chaffcutters will be busy. What the farmer most needs now, to pull up arrears of work and to enable stock to recover from any set-back received during the rough weather, is a long spell of genuine spring weather. Present indications point to an early spring.—*F. A. Macdonald.*

KUROW.—The earlier part of August was cold, with hard frosts and slight falls of snow on the back country. Feed is very scarce at present on the Upper Waitaki runs, but the weather has been much warmer during the latter part of the month, and the sunny faces are beginning to show a tinge of green. A considerable area of land in the Otiake and Otekaike districts is being planted in fruit-trees, fruitgrowing being a new industry on the Waitaki.—*G. Reid.*

DUNEDIN.—The weather during August, especially the first half, was rough and cold, with occasional snow-showers; but during the last two weeks conditions have improved very much, and the weather has been mild. Old pastures are still bare, but young grass is looking well, and there are indications of an early spring. Turnips have lasted out

very well and are still plentiful, also green feed and hay. On the whole, the dairy-farmers in the district have got through the winter very well.—*J. R. Renton.*

SUTTON.—The first half of August was changeable, with a couple of cold snaps, also an occasional hard frost. The latter two weeks were quite springlike, which has enabled farmers to get a start with their spring sowing. There is every indication of an early spring at present. Turnips have lasted well, and most farmers have sufficient to carry their stock through September. Stock are looking well, and, judging by the flocks, pastoralists should have a heavy clip this year.—*W. Scott.*

PALMERSTON SOUTH.—There was splendid weather throughout the past month. Rain fell on five days. The hardest frost known here for years occurred on the nights of the 12th and 13th. The fine weather experienced has enabled farmers to push ahead with their work, and all are now busy sowing. Stock are all in good condition, and turnips are yet plentiful. There is a decided spring in the grass around the coast. Prospects for the coming season are good.—*C. S. Dalgliesh.*

MOSGIEL.—The month of August was mild, with the exception of a fall of snow on the 11th, which, however, did not last very long. Farmers are taking advantage of the fine weather, and farm-work is pushed on. This is one of the earliest springs we have had in this district for many years.—*H. McLeod.*

CLYDE.—Some very severe frosts were experienced during the past month; but the weather through the days was very good. Rain fell on three days. In the Lauder district the farmers are all busy with ploughing. The rough pastures are still hanging on very well, and there is some very good feed on the high country now the snow is leaving.—*Thomas N. Baxter.*

NASEBY.—In the early part of the month snow and sleet showers were experienced. Since the 20th we have had some exceptionally warm days, and the plain has a fine green tinge, grass coming away everywhere. The ground is well soaked, and will stand a dry season. Farmers are busy ploughing and getting ready for spring sowing. Stock are looking very well, and there is plenty of feed to carry them through.—*A. T. N. Simpson.*

TAPANUI.—The weather during August was much more favourable than that of the preceding month; in consequence the ground has dried considerably, although it is still very wet. Every opportunity has been taken advantage of, and ploughing pushed on where possible. It is noticeable that more lea ground is being turned over than usual, no doubt on account of stubble lands being so wet. Turnips are still being fed off, and in the majority of cases are plentiful. A spring is noticeable in young pastures. Potatoes are being harvested still, but poor yields have resulted.—*W. J. McCulloch.*

INVERCARGILL.—July was a seasonable winter month. The first fortnight we had hard frosts, with sunny days. The latter part of the month was mild, with a fair amount of sunshine. Although rain has fallen on a good many days, the total rainfall for the month is not high. Turnips have lasted well through the winter, and as the grass is now coming along there should be no shortage of feed. Rain fell on twenty-two days.—*J. R. Whyborn.*

OTAUTAU.—The weather was fine during the greater part of the past month. There were warm spring days, and plant-life is showing green again. Farmers are not suffering by want of feed for their stock; in many cases turnips are going to waste, the lower part being allowed to rot in the ground. Preparation of the land for grain is in full swing; it is perhaps a little late, but if warm weather continues this will not be felt. —*H. F. Dencker.*

GORE.—The weather during the past month was on the whole favourable, and farmers have been able to make good headway with ploughing, &c.; some have started sowing grain crops. During the earlier part of the month we had some heavy frosts, and also some broken weather with rain and snow, but the last fortnight has been very good. Turnips are lasting well, and with the present mild weather young grass will soon come on. There is very little evidence of the grass-grub in the district this year. In some of the more-sheltered places, and where lime has been used, young grass is looking well.—*B. Grant.*

QUEENSTOWN.—August was the driest month we have had for some time. During the first fortnight we had hard frosts. Beautiful spring weather prevailed since, and light rain-showers have fallen on the last two days. Farm-work is being carried on apace now, the land being in good working-condition. So far everything points towards an early sowing.—*A. Clarke.*

OWAKA.—The first few days of the past month were very stormy, and snow fell on several occasions; but since then we have had splendid spring weather, and farm-work is being rapidly pushed on. There is a noticeable spring in the grass along the sea-coast. Turnip crops have been light, but are lasting fairly well.—*R. McGillivray.*

LUMSDEN.—During the early part of the past month the weather was exceptionally wintry; snow was lying on the ground for a week or more, and there were very severe frosts. All farm-work was retarded in consequence. The last fortnight was warm and springlike for the greater part of the time, and farmers were able to make a little headway with the ploughing. One or two heavy falls of rain were experienced; but the total rainfall was not great.—*W. S. S. Cantrell.*

PEMBROKE.—The severe frosts experienced in July continued almost without a break until about the middle of August, the days being bright and sunny. Then the weather became much milder, the odd frosty nights being less severe. Ploughing, &c., has been resumed. The recent rains will tend to hasten on the grass and thistles, which many stockowners are anxiously waiting for—spring being about a fortnight later than usual, owing to the long-continued frosts.—*J. A. Griffith.*

THE FRUIT CROP.

OFFICERS of the Orchards, Gardens, and Apiaries Division report as follows regarding orchard conditions during the month of August:—

WHANGAREI.—The weather during August has been a slight improvement upon that of the preceding month. A great deal more winter spraying has been done this year than formerly. Owing to warmer weather-conditions at latter part of month, earlier varieties of plums have burst into bloom. Peaches are showing a tendency to drop buds—this being the result possibly of several sharp frosts experienced about middle of month.—*J. W. Collard.*

AUCKLAND NORTH.—Weather has been seasonable, with less rain than usual. Several severe frosts occurred, which were beneficial in retarding peaches and plums from bursting into bloom too early. Planting and pruning well in hand.—*W. C. Thompson.*

AUCKLAND SOUTH.—The weather has been exceptionally fine, with the exception of two or three days at the beginning and end of the month. Japanese plums are blossoming heavily, and there is a good prospect for apricots and peaches.—*N. R. Pierce.*

HAMILTON.—August started wet and cold; but the weather cleared towards the middle of the month, resulting in warm days but rather cold nights. Spraying operations are well advanced. Early plums are in full bloom, and some varieties of peaches are well forward.—*T. E. Rodda.*

WANGANUI.—Many plums and peaches may now be seen in bloom in several places in this district. Pears are showing signs of quickly following suit. This early activity—about a fortnight earlier than usual—is due to the mild, dry weather of late. Should it continue, a heavy setting of stone fruit will result. Young fruit-trees have been planted during the past month under excellent conditions, the dry weather permitting the ground to be thoroughly worked, and the trees firmly planted.—*W. C. Hyde.*

MANAWATU AND WAIRARAPA.—Pruning and winter spraying practically all finished this month. Attention is being given to the planting of new orchards and the extending of old. Peaches, nectarines, and cherry plums are bursting into growth, giving every appearance of an early spring.—*G. Stratford.*

HASTINGS.—The weather during the month has been fairly favourable for work in the orchard. Winter spraying, pruning, and planting are now almost finished for the season. A heavy frost in the early part of the month had the effect of checking the early development of the buds, and the season is now about normal.—*J. A. Campbell.*

NELSON.—This has been a most favourable month for orchardists for the work of planting and spraying, and there remains still a good deal of planting to be done. Oil spraying is almost finished. Early plums are in bloom, and some of the apricots and peaches are now opening out, and give promise of an abundance of blossom.—*J. H. Thorp.*

CHRISTCHURCH.—Fine weather has prevailed during the past month, and orchard-work is well in hand. Pruning is almost finished, and oil spraying is well advanced. Bordeaux spraying is just commencing. Apples are still fairly plentiful in the local markets, while pears are getting scarce. Prices are good.—*W. J. Courtier.*

DUNEDIN.—The winter pruning is nearly finished. Red-oil spraying operations have been carried out rather extensively during the past month. All fruit-trees are showing signs of great promise for the coming season.—*W. T. Goodwin.*

WEATHER DURING AUGUST.

D. C. BATES.

DISTRICT NOTES.

Chiefly from Telegraphic Reports.

District.

1, 2, 3. The rainfall was everywhere below the average, ranging from 10 to as much as 50 per cent. The wettest portions of the month were the first and last four days. From the 16th to the 27th the weather was remarkably fine, with light south-east and easterly winds prevailing. On the night of the 12th hard frosts were experienced at many stations.

4. Fine clear days and cold nights, with easterly breezes, predominated. Rainfall less than the average by about 30 per cent.

5, 6. With the exception of a few days in the beginning, middle, and end, the month proved exceptionally fair and calm. Frosts occurred on numerous occasions, and an especially hard one on the 12th. The rainfall averaged about 25 per cent. below the usual fall for August.

7, 8. Precipitation was generally in excess of the average by about 20 per cent., as there were numerous showery days, with light easterly winds predominating. On the 4th and 12th severe frosts were recorded. The month was remarkably free from strong winds.

9. Some heavy rain fell on the 30th, with high northerly winds; otherwise the daily falls were not excessive, and the total for the month was considerably below the August mean. Between the 12th and the 27th the weather was generally fine, and during this period inland frosts were of almost daily occurrence.

10. Less than the average rainfall by as much as 70 per cent. in parts, but along the east coast portion the deficiency was much less. Fair weather predominated, and precipitation was mostly of a showery nature, but heavy rain fell on the 31st.

11. The departure from the normal rainfall in this district was variable, some stations recording slightly less and others more, the deficit being generally confined to the inland or higher country. Some heavy rain fell on the last few days of the month. During the rest of the month fair and showery weather alternated.

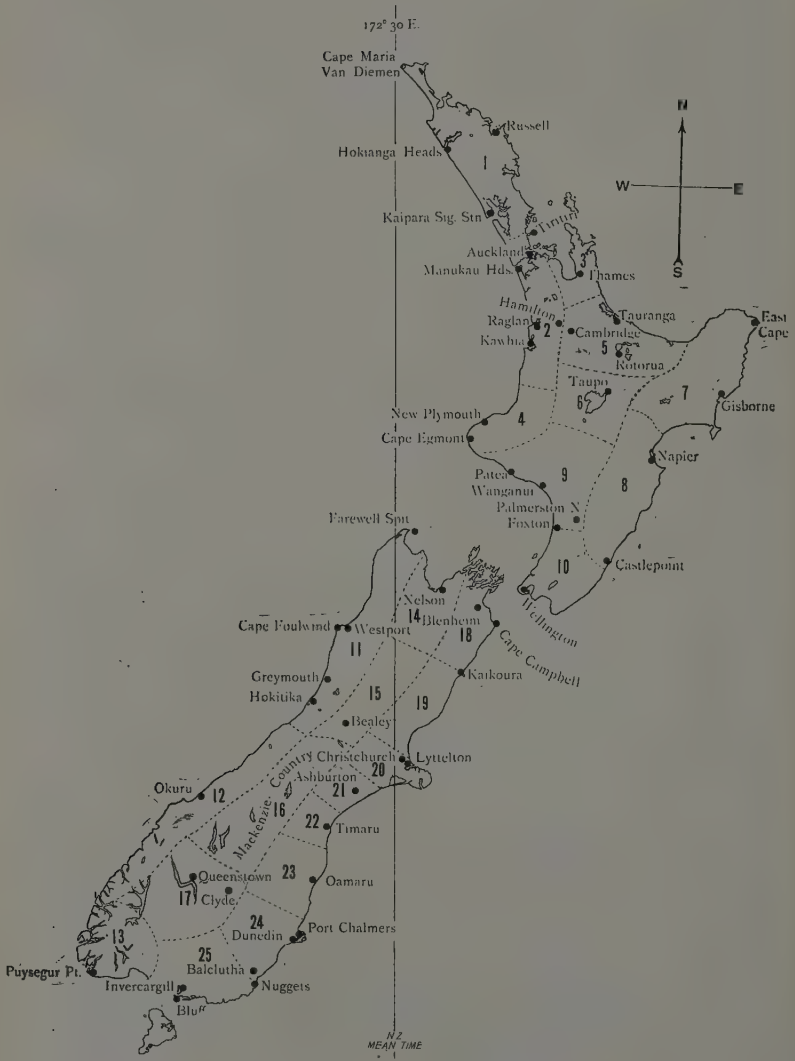
12. Generally less rain than usual fell. Weather similar to that in district 11.

13. A showery and changeable month, the total precipitation being slightly above the average.

14. Heavy rain fell on the last three days of the month, with strong easterly winds. Fair weather predominated throughout the rest of the month, and the total rainfall was usually about the average for August.

15. Precipitation about the average, and in some cases slightly less, in this district. The wettest days were the 8th, 29th, and 30th, and snow fell on several days, but not of any consequence. More than half the days were rainless. Some severe frosts were recorded.

16. There was less rainfall than usual, the month being characterized by fine and clear weather, with keen frosty nights. The last week, however, was very mild.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New Plymouth
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Cape Egmont
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Palmerston N.
Foxton
Farewell Spit
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Nelson
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Blenheim
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Wellington
Cape Foulwind
Westport
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Cape Campbell
Greymouth
Kaikoura
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Christchurch
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17. Fine and clear days were the rule, with frosty nights. There is often a deficiency of rainfall in this district in the month of August, but numerous showers brought the total up to more than the average, in some cases double the average. Snow fell in parts on the 10th.

18. Most of the rain recorded fell on the last three days, and the total generally shows a deficiency of about 75 per cent. from the average. Light winds and clear weather prevailed, and frosts were numerous.

19, 20. The rainfall was not one-third of the average at many stations, the month being free from heavy rain. Slight snow fell on the 3rd and 12th. Frosts were of almost nightly occurrence, except during the last week, when milder conditions prevailed. The winds were usually light and variable, the weather fine.

22, 23, 24. Similar weather to the other east coast districts, but more light showers fell, although the total was considerably below the average at most stations. Snow-showers were experienced on the 11th.

25. The total rainfall was slightly in excess of the average, the weather being very changeable and showery. Light snow-showers fell on several days.

SUMMARY.

August, the last month of winter in New Zealand, was on the whole a favourable month for agricultural and pastoral pursuits. The first ten days were unsettled and showery, but from the 11th to the 27th the barometer was mostly above the average, with cold and frosty nights. The rainfall was generally below the average, but cold and damp weather with easterly winds was experienced at times on the east coast under anticyclonic conditions.

More than fifty thousand old horses were shipped last year from the British Isles to Europe for slaughter for human consumption.

The French Government, by a clause in its last financial law, has assigned a credit of 200,000 francs to live-stock improvement syndicates.

Foot-and-mouth disease has been known since the time of Moses, yet its precise origin is as obscure as ever.

Attention is directed by the International Institute of Agriculture to the progress in co-operative arrangements for the improvement of live-stock in France during the last ten years, assisted recently by funds provided by the Government. Hundreds of associations have been formed for the purchase and maintenance of bulls and the keeping of herd-books.

There were considerable increases in the exports of animals from Ireland to Great Britain in the first half of 1912 as compared with that of 1911. Cattle numbered 321,795, against 277,750; sheep 242,824, against 190,153; pigs 184,126, against 156,510; horses 17,604, against 17,290. The total number of animals was 768,280 for the first half of this year, against 644,733 for the like period of last year.

ANSWERS TO CORRESPONDENTS.

LUCERNE.

MR. W. F. NORTH, Kohatu, Nelson, writes,—

I have a paddock of light loamy river land on sandy gravel subsoil. It has been ploughed all winter, and is in good heart and clean. There is no limestone about it. I propose liming some and sowing with a crop of barley and lucerne.

(1.) Will the protection of the barley be to the detriment or advantage of the lucerne ?
(2.) What variety of lucerne is best ?
(3.) How much seed per acre ?
(4.) How much ground lime per acre ?
(5.) What manure, if any, with seed ?
(6.) Where can best seed be got ?
(7.) What is best month to sow ?
(8.) Can lucerne be grazed by cattle regularly ?

The Fields and Experimental Farms Division replies,—

Several articles on the cultivation and uses of lucerne have appeared in the *Journal*, from which fairly complete information may be obtained. However, in reply to the immediate questions,—

(1.) Lucerne requires clean land, free from weeds and other plants. Barley would be grown to its detriment.

(2.) The seed grown in Marlborough, or that obtained from the Hunter River, is the most promising.

(3.) Seed per acre, about 20 lb.

(6.) The principal seedsmen.

(7.) September or October.

(8.) In New Zealand it is accepted that lucerne cannot be grazed. Its most profitable use is as a "soiling" crop—*i.e.*, cut and carted to cattle.

The Agricultural Chemist replies,—

(4.) 1 ton of lime per acre should be applied.

(5.) I would advise the following mixture for lucerne: 1½ cwt. superphosphate, 1 cwt. seed gypsum, and ¼ cwt. sulphate of potash, per acre.

MISCELLANEOUS QUERIES.

A. S., Piopio, Te Kuiti, writes,—

I shall be very glad if you will answer the following questions through the *Journal*:—

(1.) Is there anything I can do to prevent my bacon going mouldy ?

(2.) Is there any cure for mammitis ? Is Skinner's Mammitein any good ?

(3.) I have been troubled in the orchard with my trees dying, especially apples, and on examination I find the bark is rotten below the surface. They are all young trees; some having died the first season after planting out.

(4.) In one of the back numbers of the *Journal* there was a diagram of tests with different manures, and the best results were obtained with slag and superphosphate. Several of us in this locality have tried these fertilizers since with soft turnips, but none of us have had any good results, and we find on mixing the two manures they get very hot and sometimes set hard either in the bag or drill. In all cases the manure was mixed in the paddock just before sowing. Does the manure lose in fertilizing-value by heating ? Is it as good as bonedust and superphosphate for swedes ?

(5.) What potatoes did the best at Ruakura Farm of Instruction last year ?

The Live-stock and Meat Division replies,—

(1.) Cover the bacon with thin calico, then place in a larger bag, filling in between with oaten husks, which can be obtained from any mill which makes oatmeal.

(2.) If the case is taken in the early stages, there is a chance of recovery taking place. We forward you a bulletin on the subject. You can supplement the treat-

ment advised in the same—viz., the injection of the boracic-acid solution—by fomenting the udder with hot water three times a day for a few days, using a piece of old blanket doubled. After fomentation rub the affected quarters with belladonna ointment. Endeavour to draw as much of the secretion out of the quarter as possible. You will find you can do this better after fomenting than before. Give at the onset a drench composed of 12 oz. epsom salts, 1 oz. nitre, 1 oz. ground ginger in a quart of thin oatmeal-gruel. This can be repeated if necessary in about three days. With regard to Skinner's Mammitein: we always make a point of not commenting on any proprietary articles.

The Orchards, Gardens, and Apiaries Division replies,—

(3.) Your trees have no doubt been attacked by root-fungus, which causes the bark to rot below the surface. Prevention is the only satisfactory method of dealing with this disease. In localities where root-fungus is troublesome it would be a wise precaution before planting to treat the soil where the trees are to stand with a pound of sulphate of iron, which should be well worked in. In the case of trees already planted, sprinkle the same quantity over the soil near the stems and lightly work in.

The Agricultural Chemist replies,—

(4.) Basic slag and superphosphate when mixed have given excellent results on turnips, but the mixture must be sown soon after it is made, or a diluent, such as gypsum, sand, or dry earth, mixed in with the fertilizer (see article on "Basic Slag" in *Journal* for July). By mixing, the water-soluble phosphate in the superphosphate becomes insoluble, but this does not necessarily mean that the fertilizer becomes less efficacious. The soil and the climate are factors which must be taken into consideration. As the climate varies from year to year so does the efficacy of different fertilizers.

The Fields and Experimental Farms Division replies,—

(5.) According to information supplied by the Manager of Ruakura Farm of Instruction, to be found in the July number of the *Journal*, Up-to-date and Northern Star gave the best results last year.

ANGORA GOATS.

MR. R. G. KENNEDY, Tahora, Taranaki, writes,—

I have about twenty-five Angora goats, some half-bred and the others pure. The nannies are beginning to kid now, and I fancy it is too early, as we generally have rough weather at this time of the year. What is your opinion?

The Live-stock and Meat Division replies,—

Regarding your nannies beginning to kid in the cold winter weather, we quite agree with you that it is too early, and we are afraid that you will lose a good many in consequence. Kids are very delicate for a few days after birth, and exposure to inclement weather-conditions at this time of the year should be avoided. What we should advise you to do if bad weather comes on is to put them into some shed or else make them some straw hurdles, so as to give them all the protection you can. As you have only got twenty-five head we presume they are more or less domesticated, and that this can be done.

There are only a very few angoras in this country, and they are somewhat widely dispersed, consequently what might be considered good management in, say, the northern part of the Dominion might not apply to what should be done in your district in Taranaki; consequently books on management of the angora goat are generally only applicable to the country they are written for. Probably the best work on the angora is by Mr. S. C. Cronwright-Schreiner, of Cape Colony. In this book he gives a history of the breed, &c. His remarks on management, however, apply in the main to the conditions in South Africa. The Bureau of Animal Industry, U.S.A., also publishes a bulletin on the subject, and again this is mainly information for owners in that country. It is therefore necessary for owners in New Zealand to carefully observe and record their experience, so that we can come to some conclusion as to whether the climate of the Dominion is suitable for them.

Being browsing animals, they are of undoubted value in helping to keep down such plants as briar, blackberry, &c., but it is a question whether they could be

kept in such numbers as to be profitable from the mohair-producing aspect, owing to the humid climate of this country.

The males are in some countries termed bucks, in other countries billies; females are called does or nannies. The period of gestation is about the same as that of the ewe, generally from 147 to 155 days. It is evident, therefore, that in breeding there must be the same separation of the sexes as is customary in the case of sheep if you are to regulate the period of kidding. The best time for the kids to be dropped is early spring, when there is some chance of the plants budding, thus enhancing the milk-yield of the mother, and being more favourable as regards climatic conditions for the newly born kid. As a rough guide I should take the practice of the district as regards lambing into consideration, and arrange for the kids to be born about a month later. A kid when dropped has only a thin coat, unlike the lamb. However, while the lamb with his woolly coat has generally to rough it and follow his mother in an open paddock, the nanny, on the other hand, has generally more cover, such as rough scrub, and she sees that her young is generally well protected by some bush, &c., leaving it only during the time she is feeding. Purebred angoras usually have only one kid. If crossed on the common goat the result is generally twins. It is better not to wean them until they are about five months old. Male kids, if not wanted as such, may be castrated when about a fortnight to three weeks old if the weather is favourable. The fleece of the angora is termed mohair, and is generally in wavy curls or ringlets, and under good conditions can be grown to 8 in. or 10 in. in length. Probably 2½ lb. to 3½ lb. is an average fleece. Even in the best-bred angoras there is a large proportion of "kemp."

With regard to the crossing of purebred angora billies with common goats, it is stated that in about three crosses the fleece can be styled as mohair. In this connection it is advocated that the common goats used for such purposes should be as nearly white in colour as possible. The dentition of the angora differs somewhat from that of sheep. The two middle incisor teeth are cut at two years, the next pair at three, the lateral corners at four, while at five years the goat has a full mouth.

It is better not to breed from the nannies until they are sixteen to eighteen months old, although they will come in season much earlier. Angora goats are at their best between the age of two and six years. So far as we know they are not very susceptible to disease, but if kept under adverse conditions it is difficult to say how they may fare—in all probability stomachic parasites, as in the case of sheep, being most likely to cause loss.

APPLE-TREES.

"GLENFIELD" writes,—

I have several fine Scarlet Pearmain apple-trees ruined by the bark round the trunk dying. It shows by bark turning black and deadlike, then splitting and lifting off the trunk. On examination I find under the bark a maggot eating just between the bark and the wood. It is not boring into the wood centre of the tree. I do not know whether the worm causes the damage or whether it comes afterwards. On some of the trees only a very narrow strip of bark is alive. I expect the tree will die. Astrachan apples are also similarly affected. By same post I send specimen of dead bark and maggots from an Astrachan tree.

The Orchards, Gardens, and Apiaries Division replies,—

The trees are evidently attacked by canker. The "worm" you mention is the caterpillar of a moth. It is merely sheltering under the bark, and is not causing the damage. Judging from the bark specimens sent I should think the trees have been neglected. This, however, can only be decided by inspection, and the Orchard Instructor for the district will be asked to see and advise you.

LAMPAS.

MESSRS. ATTWOOD BROS., Kara, Whangarei, write,—

We have a couple of young horses on our place suffering badly from lampas. What is the best method of getting rid of lampas, and why is burning them out, if properly done, so much objected to that there is a heavy fine for doing it?

The Live-stock and Meat Division replies,—

It is not uncommon for young horses, when cutting their permanent upper incisor teeth, to have an inflamed condition of the mucous membrane of the gums and of the hard palate. This constitutes the so-called lampas. In these true cases of lampas the membranes are swollen owing to the infiltration of serum into the submucous tissue, causing the gums to descend below the level of the tables of the incisors, which at this time have not attained their full growth, thus making the gum appear more prominent than it really is. The animal does not like the mouth examined, and if the gums are pressed upon evinces pain, and is disinclined to feed, as prehension and mastication hurt him. Giving food in the form of soft mashes, &c., for a time is generally all that is required; and a handful of Epsom salts may be given in these or his drinking-water every other day. If the portion of the palate immediately behind the upper front teeth is much swollen and painful, it may be lightly scarified with a sharp-pointed clean knife, and a little powdered alum applied. In many cases horses have naturally very prominent palates, often being on a level of the tooth-tables. This is what is generally termed "lampas" by horsemen. In point of fact it is nothing of the kind, and the animal is not affected by it, neither is there pain on pressure nor an inflamed appearance of the palate. It is this condition that ignorant persons think should be got rid of, either by cutting, puncturing with a sharp horse-nail, or by using a red-hot iron with a curve at the end. There is no doubt that the latter is cruelty, and the two former proceedings do no good. You have only to look at the horse a week or so afterwards and you will find the condition still there. Burning, apart from causing great pain, disfigures the mouth, leaving a hollow behind the teeth which never fills up. There is great risk, too, of injuring the palatine artery, in which case you get hæmorrhage, which is extremely difficult to stop and has been known to prove fatal. Accompanying the artery is the palatine nerve, which provides sensibility to the hard palate and also the roots of the incisor teeth. If the artery is injured by the burning it is reasonable to assume that the nerve is also, and thus incalculable damage is done both to the palate and the teeth.

SOFT DUCK-EGGS.—GOAT FOOT-ROT.

J. K. WHITFORD, Auckland, writes,—

I shall be greatly obliged if you will favour me with answers to the following questions:—

(1.) My ducks lay a large percentage of soft eggs, and this has been going on for some time. The ducks get proper food, but this seems to make no difference. I give them plenty of broken shells and sand taken from the beach. Can it be the salt that may be about the shells?

(2.) Several of my goats are fairly bad, and have been for some time, with foot-rot. I have treated them frequently with bluestone, with no result. I may mention that the worst cases are those of the Angora cross, the common ones of the light-haired species not being affected. A neighbour of mine has a better class of Angora, and they are badly affected. His land is volcanic, with plenty of rock on the surface. Perhaps the Angora cannot stand the Auckland rainfall.

The Live-stock and Meat Division replies,—

(1.) It is rather difficult to say what is the cause. You appear to be treating them all right. It would have been better if you had stated the exact number of soft eggs you have found in any one day. This would have answered the question as to how many offenders there were in the flock. There may be only one or two of them, and it is possible they have some abnormal condition of the membrane of the oviduct, or egg-passage. Try giving a complete change of food, and roast or burn the shell before giving it them. Also supply them with some broken-up scoria. The habits of the duck tribe, seeing how many of them use the sea, would preclude the idea of salt being in any way injurious.

(2.) All species of the goat tribe are liable to suffer from disease of the feet when kept on pastures. Their natural habitat is hard, dry, hilly country. I do not think that the foot-rot is of the contagious form so commonly found in sheep, but rather due to the introduction of dirt, &c., into cracks in the hoof, setting up a suppurative and destructive condition. With a sharp knife pare the hooves down to a natural condition, cutting off all loose horn. If goats (and sheep also) are put on soft land, the tendency is for the hooves to grow out of proper proportion, owing to not having the necessary attrition to keep them level. After preparing the feet with the knife.

dress the parts with a mixture of butyr of antimony and tincture of myrrh in equal parts. This should be applied with a stout feather every other day or so. As a preventive measure I should advise you to run the goats (and this would apply to sheep also) through a medicated foot-bath. This has the effect of both hardening the hoof and also destroying any micro-organisms likely to gain access to the internal parts of the foot through abrasions, cracks, &c. Make a stout wooden trough, 6 ft. to 9 ft. long, 18 in. wide, and 9 in. high at the sides and front. Battens should be placed crosswise on the bottom, to prevent the animals slipping when going through. A race should be constructed by placing hurdles on each side, also on the approach and exit. Solutions of arsenic and sulphate of copper (bluestone) are both advocated. Probably the copper-solution, on account of its not being so poisonous, is to be preferred. Both are efficacious. Half a pound of powdered sulphate of copper should be dissolved in a gallon of soft water, and a sufficiency of solution of this strength should be placed in the trough, so as to just cover the hooves of the animals. They may then be driven slowly through. It is just as well that the operation should be carried out on fallow or bare ground, in order that pasture may not be contaminated with the poisonous dripping from the feet of the animals.

"Corn Stover."

Mr. Chas. Tarrant, Woodhill, Kaipara, writes,—

What is meant by the term "corn stover" one often finds in American dairy-books? Is it corn or maize cured or saved as hay? If so, will you kindly advise me through the *Journal* how it is done? I have been told that maize will not cure satisfactorily in this climate owing to its absorbing the moisture so much when stacked away.

The Fields and Experimental Farms Division replies,—

"Stover" is chaffed or shredded stalks of maize. There is the difficulty of drying so thick a stalk as that of maize; but if once dried, and stacked in that condition, it would remain so. There is no experience in New Zealand of the details of the operation, and on account of the moist climate and the advanced season of the year after the cobs are picked, there would no doubt be very great difficulty in saving the stalks; it is doubtful if the labour would be warranted by results. It must be remembered that in the United States of America, with their rigorous climate, all maize fodder is of far greater importance and value than in New Zealand.

Sand Country.

P. S., Te Rongomai, Otaki, writes,—

I would be much obliged if you could inform me through your next issue what are the dairying possibilities of the low-lying sand country along the west coast, and if any great improvement has been made with similar country elsewhere.

The Fields and Experimental Farms Division replies,—

It is unlikely that the greater extent of the low-lying sand country of the west coast will be of appreciable value for grazing. There may be certain parts amenable to improvement. The Department has before it to-day no information that great improvement for pasturage has been effected on similar country elsewhere. In other countries where such lands have been dealt with it has usually been in the direction of afforestation.

Inoculation of the Soil.—Potash Salts.

Mr. Chas. C. Neal, Okania, Matamata, writes,—

I have a piece of new land (140 acres) of medium quality, which was put in red clover about eighteen months ago. It was previously in fern and tea-tree. Like almost all new Waikato land, it is deficient in nitrogenous matter, and I suppose it would have been advisable to have inoculated the soil before sowing the clover.

(1.) Would it be possible to inoculate the soil now by giving it a good top-dressing of inoculated soil, and would such a course be advisable?

(2.) In putting in lucerne, is inoculated soil from a clover-patch just as good for it as from a lucerne-plot?

(3.) After adding inoculation to a soil, how long does it take for the bacteria to develop sufficiently to use that soil to inoculate other soils ?

(4.) Why is it that sulphate of potash (96 per cent.) is more generally used than muriate of potash (95 per cent.), seeing that the muriate (KCl. at 95 per cent.) contains about 8 per cent. more pure potash than the sulphate (K_2SO_4 at 96 per cent.), and both cost the same per ton ?

The Fields and Experimental Farms Division replies,—

(1.) Soil taken from a clover-field that has been established for not less than three years should contain a sufficient quantity of nitrogen bacteria to inoculate land that does not grow red clover well. The amount needed per acre would be about 3 cwt. Top-dressing with inoculated soil is of little value unless rains occur directly after the top-dressing and wash the bacteria into the soil. Where the top-dressing becomes dry the bacteria are liable to lose their vitality in a very short space of time.

(2.) Soil from a red-clover field is of no value in inoculating lucerne.

(3.) The older a lucerne-patch the more bacteria there will be present. Soil is of very little value from ground that has been in lucerne less than two years.

The Agricultural Chemist replies,—

(4.) The action of potash salts on the soil is imperfectly understood, and no reply can be given to the question why the sulphate is more generally used than the muriate, further than that practice has proved it superior in some cases.

PIT ENSILAGE.

MR. J. P. WILSON, Papakaio, Oamaru, writes,—

In the October (1910) number of the *Journal* (page 339) you state that "Temperature is the first factor in making silage." Would you please inform me how this affects pit ensilage. I understand that the pit can be filled and closed in the same day. Which grade of ensilage is usually taken from the pit—acid, sweet green, or sweet brown ?

The Fields and Experimental Farms Division replies,—

As stated in the *Journal* mentioned, the temperature determines the description of silage as sweet or sour, and the light or heavy loading or pressure determines that temperature in the stack or silo or pit. If, as you say, the pit is filled and closed in one day, the same results from temperature and pressure are, within limits, obtained, but sour silage would probably result, as the temperature would not have been permitted to rise.

INOCULATION WITH BACTERIA.

"KIRIMOA," Dunedin, writes,—

Having seen in local papers recently that a grower in the Masterton district has greatly increased his crop of potatoes by inoculating with bacteria, I shall be glad if you can supply any information as to (*a*) what these bacteria are, (*b*) how and when the inoculation is done, (*c*) what manures (if any) are considered suitable for use at the same time.

The Fields and Experimental Farms Division replies,—

It has also been noted here that a grower in Masterton is stated to have increased his crop of potatoes by inoculation with bacteria. So far as is known this inoculation is of no value whatever except with leguminous plants, and it would be only misleading to recommend its application to potatoes. On all leguminous plants (peas, beans, lucerne, &c.) certain nodules are observed on the roots. These nodules are claimed to contain bacteria which have the power of gathering nitrogen from the atmosphere. Mr. J. A. Lutz, Bank Chambers, Lambton Quay, Wellington, supplies a preparation known as bacteria-inoculation for leguminous plants. This is in the form of a culture. The seed is saturated in this preparation immediately before planting.

The Agricultural Chemist replies,—

(*c*.) Apply 4½ cwt. superphosphate, ¾ cwt. sulphate of ammonia, and 1 cwt. muriate of potash, per acre, for potatoes.

SILVER-BEET AND RAPE.

"COCKATOO," Makotuku, Hawke's Bay, writes,—

Would you please inform me through your *Journal* whether it would be advisable to sow silver-beet in preference to rape; also what amount of seed is required per acre, and what manure is to be employed, and in what quantity per acre? The soil is a heavy loam on clay subsoil, the land being about 1,100 ft. above sea-level. When would you advise me to sow?

The Fields and Experimental Farms Division replies,—

The actual value of silver-beet for feeding has yet to be definitely tested. All that is known is that it yields largely, and that it is readily consumed by stock; but there is yet no experience on which to advise as to its superiority to rape. The amount of seed required per acre is about 7 lb. It should be sown at the same time and receive the same treatment as the mangel crop.

The Agricultural Chemist replies,—

For rape, manure with 1 cwt. superphosphate and ½ cwt. bonedust per acre; for silver-beet, use 1 cwt. superphosphate, ¾ cwt. bonedust and blood, and ¼ cwt. sulphate of potash, per acre.

GRASS-SEED.

MR. H. G. BERRYMAN, Kohatu, Nelson, writes,—

Will you kindly publish in the *Journal* a description of the best mixture of grass-seed for surface sowing on bush clearings, and how much per acre?

The Fields and Experimental Farms Division replies,—

On the lower lands of the general description, 15 lb. of cocksfoot, 3 lb. of fiorin, 2 lb. of white clover; if the quality of the soil is better than usual, add 7 lb. of rye-grass. It is doubtful if other varieties are profitable. On the hills danthonia has so strikingly asserted itself as the dominating grass that no other recommendation is possible but to make use of it. It is, unfortunately, an expensive seed, selling now at about 1s. 1d. per pound, and the quantity should be not less than 15 lb. per acre. It should, however, be possible for farmers to gather the seed themselves, roughly dress it, and so provide seed at a much less cost than by purchase from seed-merchants. There may be added 1 lb. of white clover and 1 lb. of fiorin. An examination of the grass on the birch hills shows danthonia and but few other grasses.

DIARY FOR FARMERS.

MR. GILBERT WINSLOW, Mount Benger, Roxburgh, writes,—

Do you know of any diary especially for a farmer's use?

The Fields and Experimental Farms Division replies,—

Messrs. Whitcombe and Tombs issue a book entitled "New Zealand Farmers' Account-book," which is considered a very useful publication. The price is 12s. 6d.

BALDRIDGE TREATMENT OF FOUL-BROOD.

"BEEKEEPER," Hawera, writes,—

Will you kindly give a description of the Baldridge method of treatment in the inquiry part of the *Journal?*

The Orchards, Gardens, and Apiaries Division replies,—

About seventeen years ago Mr. Baldridge, an American beekeeper, called attention in the *Beekeepers' Review* to a method he had adopted for saving all the healthy brood when treating colonies for foul-brood. He claimed that by his plan he had cured diseased colonies with little or no loss of healthy brood. About two years ago, while his method was being much discussed, Mr. Baldridge, in one of the bee journals, published a slight modification of his first plan, which experience

had shown him to be an improvement. Some have spoken well of his treatment, but it has not been generally followed. The following is from Mr. Baldridge himself :—

"I prepare an empty hive by filling the brood-chamber with a set of frames—less one or two—filled with comb-foundation or simply narrow strips of the same. I go to any strong healthy colony and remove one or two frames of brood, with or without the adhering bees, and place the same in a prepared hive. As gently as possible I reverse the hive of the diseased colony by turning it end for end, and move it sideways the width of the hive, or a trifle more, and leave the bee-entrance open. When this is done I place the prepared hive on the old stand, but with its bee-entrance in the opposite direction or in the original position. This may all be done at any time in the forenoon, or when the bees are busy flying. The bees will, on their return from work or play, enter the prepared hive and remain there, and within two or three days the main force of the mature bees will be transferred to their old location. Toward sunset blow a few puffs of smoke on the caged Queen, to drive the bees away from it, and then transfer the Queen in the colony to the prepared hive. She may be given her liberty at once, and by way of the bee-entrance. Now close the bee-entrance of the diseased colony, so that no bees can pass in or out except through a bee-escape (a long cone-shaped tube of wire cloth), and gently reverse the hive again, so that both hives will now face the same way. Both hives should now stand close together, or within an inch or so of each other. From now on, all the bees in the diseased colony must pass out through the bee-escape, and as they cannot return through the escape they will go into the prepared hive. In about three weeks all the healthy brood in the diseased colony will have emerged, and soon thereafter all the bees will be in the prepared hive, and no loss of bees or labour. The contents of the diseased hive may now be taken to some proper place and be disposed of by burning the same. This is best done in a building or some place where no outside bees can gain access to get at the honey or combs. But it is not necessary that this should be a total loss. Such combs as contain honey and are free of diseased brood may be extracted and saved for table use, and the combs be melted into wax. Those that contain brood may as well be burned up at once, frames and all, as the cost of replacing them nowadays is but a trifle. By this time the prepared hive will, or should be, full of both comb and brood, and without any foul-brood or any trace of the disease; in fact, it will be and remain a healthy colony—at least, that has been my experience."

ERADICATING BIDABID AND RAGWORT.

"BIDABID," Wellington, writes,—

(1.) What is the best way to get rid of hutiwai or bidabid? What stock will eat it?

(2.) What is the best way to eradicate ragwort?

The Fields and Experimental Farms Division replies,—

(1.) It is assumed that the plants mentioned are on country that cannot be cultivated, partly grassed hills. Bidabid can be controlled by fires, followed with grass-seed sowing and judicious stocking. This weed is not usually of serious importance after grass is established and country improved.

(2.) If the area infested is not too extensive control can be obtained by cutting before flowering. This cutting may require to be repeated twice or possibly three times in certain seasons. On large areas sheep in sufficient numbers control the plant. Stock should not be confined to ragwort-infested land for too long a time, not more than a month or six weeks, or the injurious effect of the plant will be manifested.

PHOSPHORIC ACID.

MR. T. HARRIS, Putaruru, writes,—

Could you please inform me in the next issue of the *Journal* whether the phosphoric acid in Malden or Christmas Island guanos is as good as that in basic slag?

The Agricultural Chemist replies,—

No, it is not. About 80 per cent. of the phosphoric acid in basic slag is, or should be, soluble in a 2-per-cent. solution of citric acid, whereas that of guano is practically insoluble in this solution.

LIME.

MR. W. W. WILSON, Kapuka South, Southland, writes,—

I have a Government section here of over 200 acres, and the land is of a nature I have not been accustomed to. There are low ridges of fairly heavy soil from 10 in. to 18 in. deep on top of a hard pan-like subsoil of red clay and shingle; and the flats are very swampy and mossy, with a similar subsoil but at a much greater depth (from 3 ft. to 6 ft.), the whole of the land being covered with manuka scrub, tussock, wire-weed, fern, &c. I have cleared, drained, and ploughed a considerable area of the ridges, and am told that lime is what the land requires before I can expect grass or crops of any kind. I am thinking of trying a crop of potatoes, and propose scattering 2 tons of ground burnt lime to the acre, afterwards manuring with some good potato-manure. What effect would the lime have in the first season on the potato-seed? Would it be wise to scatter the lime and wait until next year before potato-cropping? Would it be best to scatter the potato-manure with a drill or sow a little (what quantity) by hand with each seed? Does the land of this district require 2 tons of lime to the acre?

The Agricultural Chemist replies,—

The effect of lime will probably be beneficial to the potato if only one crop is to be sown; if further crops of potatoes are to follow on the same land it might have a tendency to produce scab. Two tons of lime per acre would be a good dressing.

ARTICHOKES.

MR. W. D. KNOWLES, Manutahi, Taranaki, writes,—

I would like your opinion on growing artichokes for pigs. I have heard they make excellent food for matured pigs, but have had no experience in any way with this plant. Could you kindly tell me how and when they are planted, whether they are attacked by blights or not, and which is the best variety to plant if there is more than one variety?

The Fields and Experimental Farms Division replies,—

This plant is not in appreciable cultivation except in the garden. It is, however, recognized as a valuable food for pigs. It is claimed that it is best used when the pig is allowed to root the tubers out of the ground for itself. It is found that pigs require to become accustomed to this food, as at first the tuber is not readily eaten. Soil and cultivation for the artichoke are practically the same as applied to the potato, except that the tubers should be planted at 3 ft. apart each way. The artichoke produces a somewhat heavier crop than the potato, and the food-values of these plants are about the same. The artichoke does not store well when lifted; it can, however, remain in the ground through the winter without injury. The plant is singularly free from disease or pests. On the Continent of Europe, where the artichoke is much more highly esteemed than with us, many varieties are in cultivation. Seedsmen in New Zealand catalogue the Purple or Common and Sutton's White varieties.

FEEDING OFF WHEAT.

MR. R. W. GAINSFORD, Cave, South Canterbury, writes,—

I have a paddock of Solid Straw Tuscan wheat sown last April, which is looking well and making good growth. Could you tell me if it would do any good to eat it off? I have plenty of feed and do not wish to feed it off unless it would benefit the wheat. I have also a paddock of oats and grass sown last March and intended for crop. How long would it be advisable to leave stock on?

The Fields and Experimental Farms Division replies,—

It is impossible to advise without much more detailed information. It is obvious that a crop on well-drained land may be fed off, while it would be inadmissible to allow stock to even move over other land. It is generally believed that feeding off encourages the tillering of the plant, and to some extent strengthens it; beyond this there is no authoritative experience. Your course can only be determined by your own observation of the condition of the crop, the land, and the season.

SHIPMENTS OF PRIMARY PRODUCE FROM NEW ZEALAND TO UNITED KINGDOM.

COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF THE CURRENT AND PRECEDING SEASONS.

Month.		Mutton, Carcases.	Lamb, Carcases.	Beef, Quarters.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Cases.	Sundry.
January,	1912	237,284	302,399	12,424	114,512	64,005	95,994	..	..	7,295	6,365	1,942	3,407	59 carcases pork.
"	*1911*	*175,337*	*287,120*	*13,568*	*90,405*	*46,375*	*127,199*	..	*16*	*399*	*15,234*	*3,302*	*7,094*	*590* "
February,	1912	208,424	273,246	13,052	101,544	62,398	106,074	607	..	..	6,831	1,615	1,056	..
"	*1911*	*242,090*	*450,406*	*24,924*	*86,368*	*46,667*	*70,030*	*23,694*	*200*	..	*4,428*	*1,302*	*2,113*	*1,369 carcases pork.*
March,	1912	324,192	518,402	20,201	64,925	49,308	70,022	..	4,980	..	3,832	1,352	2,644	16 carcases pork.
"	*1911*	*264,297*	*665,822*	*26,657*	*45,912*	*40,668*	*58,362*	*40,276*	..	..	*3,650*	*1,583*	*8,982*	*2,408* "
April,	1912	213,178	355,829	7,046	38,986	38,137	31,615	4,905	2,180	..	5,134	1,958	4,458	..
"	*1911*	*172,503*	*491,413*	*19,106*	*14,823*	*33,411*	*42,917*	*38,456*	*6*	..	*9,233*	*1,827*	*2,577*	*2,431 carcases pork.*
May,	1912	454,506	744,287	32,691	1,441	40,535	51,833	11,157	26,569	1,500	11,963	2,826	6,287	..
"	*1911*	*204,390*	*377,105*	*20,173*	*995*	*20,732*	*33,033*	*93,854*	..	..	*7,443*	*1,210*	*7,720*	*1,087 carcases pork.*
June,	1912	170,738	287,697	24,605	558	7,712	18,138	9,160	7,622	2,039	5,646	1,168	1,213	221 carcases pork.
"	*1911*	*214,079*	*448,432*	*15,789*	..	*6,323*	*19,568*	*39,422*	..	*14,128*	*4,763*	*525*	*5,528*	*2,434* "
July,	1912	291,097	371,474	29,457	684	1,255	16,567	44,324	23,216	20,573	7,463	1,856	5,892	210 carcases pork.
"	*1911*	*206,869*	*260,761*	*14,296*	..	*276*	*14,100*	*29,452*	..	*10,334*	*6,022*	*1,073*	*2,786*	*175* "
August,	1912	207,239	157,589	10,478	559	..	10,409	42,580	38,802	19,562	3,758	523	4,219	..
"	*1911*	*66,608*	*110,054*	*3,653*	..	..	*5,260*	*31,976*	..	*18,231*	*3,443*	*303*	*3,475*	*203 carcases pork.*
September,	1911	102,081	40,057	6,059	6,404	..	7,390	38,151	..	33,059	5,604	393	7,672	220 carcases pork.
"	*1910*	*104,925*	*26,416*	*8,420*	*22,644*	*41*	*6,539*	*40,876*	*3,863*	*7,721*	*2,680*	*597*	*1,682*	*255* "
October,	1911	9,417	2,043	100	49,626	11,501	2,182	..	..	32,094	4,514	754	2,982	..
"	*1910*	*49,010*	*800*	*10,531*	*60,014*	*9,159*	*3,189*	*94,815*	*23,330*	*36,947*	*3,632*	*1,232*	*3,089*	*56 carcases pork.*
November,	1911	47,770	10,427	403	135,741	57,319	44,934	15,833	..	16,606	7,844	2,183	3,085	..
"	*1910*	*62,926*	*29,877*	*5,554*	*105,759*	*27,749*	*55,551*	*76,594*	*331*	*28,646*	*6,850*	*2,300*	*4,339*	*911 carcases pork.*
December,	1911	72,192	91,965	765	109,397	46,883	54,297	..	..	4,366	5,719	1,364	2,708	..
"	*1910*	*82,405*	*157,172*	*13,155*	*182,051*	*67,162*	*59,080*	..	..	*9,716*	*4,524*	*109*	*5,363*	*686 carcases pork.*

STOCK EXPORTED.

AUGUST, 1912.

THE following table shows the numbers and descriptions of stock exported from the Dominion :—

Port of Shipment.	Horses.			Cattle.			Sheep.			Swine.
	To Australia.	To Pacific Islands.	To India.	To Pacific Islands.	To Australia.	To Java.	To Australia.	To South America.	To Pacific Islands.	To Pacific Islands.
Auckland	21	7	..	46	..	..	..	..	316	30
Gisborne	..	..	..	..	..	..	..	..	..	..
Napier	1	..	..	..	..	..	..	..	..	..
Wellington	42	..	..	..	..	..	..	10	..	..
Lyttelton	7	..	..	..	..	..	327	..	..	..
Timaru	..	..	..	..	..	..	..	..	..	..
Dunedin	30	..	..	..	..	..	262	..	..	..
Bluff	6	..	..	..	..	..	..	..	..	..
Totals	107	7	..	46	..	..	589	10	316	30

Following are particulars of the horses shipped : 74 draughts (1 stallion, 41 mares, 30 geldings, 1 colt, 1 filly), 4 medium draughts (1 mare, 3 geldings), 13 thoroughbreds (2 stallions, 4 mares, 7 geldings), 10 hackneys (5 mares, 5 geldings), 4 trotting-horses (1 stallion, 1 mare, 2 geldings), 8 ponies (3 mares, 5 geldings), 1 race gelding.

STOCK IN QUARANTINE.

THE following stock was received into quarantine during the month of August :—

No.	Breed.	Sex.	Port of Origin.	Owner or Agent.	Address.
		MOTUIHI ISLAND (AUCKLAND).			
1	Shorthorn ..	Bull ..	Sydney ..	New Zealand Loan and Mercantile	Auckland.
3	Holstein ..	Heifers ..	Vancouver	J. H. Parkinson ..	Opotiki.
		SOMES ISLAND (WELLINGTON).			
1	Collie ..	Male	Liverpool ..	Mr. Jones ..	Masterton.
1	Irish setter ..	" ..	" ..	J. O'Neill ..	Westport.
1	" ..	Female ..	" ..	" ..	"
1	" ..	Male ..	" ..	F. Daines ..	Blenheim.
		QUAIL ISLAND (LYTTELTON).			
1	Collie ..	Female ..	Liverpool ..	J. Lillico	Lochiel.
4	Collie pups ..	" ..	Dropped on voyage	"	"
3	" ..	Male ..	Ditto ..	"	"

ARGENTINE TRADE WITH BRITAIN.

The Department has received the following cablegram from Buenos Aires, dated 6th September, 1912 :—

The following shipments of produce were despatched from the Argentine to the United Kingdom ports during August, 1912 (compared with August, 1911) :—

	1912.	1911.
Frozen beef (quarters)	231,000	141,000
Chilled beef (quarters)	224,000	150,000
Frozen mutton (carcases)	157,000	235,000
Frozen lamb (carcases)	42,000	101,000
Butter (cwt.)	..	..

PRODUCE IMPORTED.

THE following return, compiled by the Customs Department, shows the total importations into New Zealand during the month of August, 1912, of agricultural and farm products :—

Item.	Quantity.	Value.
		£
Bran	tons	..
Butter	cwt.	..
Cheese	7 cwt.	15
Chaff	tons	..
Fruits, fresh, all kinds	1,623,957 lb.	13,277
Barley	centals	..
Oats	centals	..
Wheat	centals	..
Onions	3,158 cwt.	2,186
Pollard and sharps	tons	..
Potatoes	1 ton	13
Seeds, grass and clover	705 cwt.	2,747
Total values imported ..	..	£18,238

AUSTRALIAN SHIPMENTS.

FOLLOWING were the Australian shipments made by the subsidized New Zealand-Canadian service since the 29th July :—

"Zealandia," from Sydney, 26th August, 1912.—For Honolulu—2 cases meat, 713 bags dried blood, 39 bags, 1 case, and 23 sacks grass-seed, 1,269 sacks sulphate ammonia ; for Vancouver—40 carcases and 110 pairs legs mutton, 176 carcases and 400 sides veal, 71 cases meat, 50 crates rabbits, 14 bales and 1 package skins, 27 bales and 7,778 hides, 100 cases lemons, 30 cases fruit-pulp, 1,130 pieces timber ; for Victoria (B.C.) —150 carcases mutton, 154 sides veal, 30 crates rabbits, 116 cases meat ; for Seattle—8,254 sup. ft. timber ; for New York—81 bales skins ; for Fanning Islands—41 packages stores. Transhipments : 12 boxes butter, 65 cases jams, 190 bales wool, 462 bales and 1,575 skins, 141 bags and 568 sacks hides.

NEW ZEALAND-VANCOUVER SUBSIDIZED STEAM SERVICES.

FOLLOWING are the shipments of produce for Vancouver and North American ports from New Zealand since March last:—

	"Marama," 12th April.	"Makura," 14th May.	"Zealandia," 10th June.	"Marama," 5th July.	"Makura," 2nd Aug.	"Zealandia," 30th Aug.
Butter, boxes	3,300	1,510	80	1,600	3,987	2,717
Lamb, carcases	10	..	..	..	..	..
Mutton, "	30	..	..	..	..	..
Veal, "	27	52	..	..	..	..
Beef, quarters	6	8	40	..	..	..
Beef, boned, bags	10	25	605	..	..	..
Frozen sundries, packages	11	7	8	4	6	8
Wool, bales	10	178	27	9	21	..
Pelts, casks	5	..	..	..	..	..
Grass-seeds, beans, &c., sacks	383	..	260	21	430	..
Hides and skins, sacks, &c.	217	419	344	861	425	454
Onions, cases	2,429	350	2	..	..	3
Sheep-skins, bales	..	45	35	..	20	..
Jam, cases	..	150	..	..	..	50
Sundries, packages	4	46	111	110	144	90
Potatoes, crates	..	..	17	..	..	21
Kauri-gum, packages	..	..	..	..	..	72

NEW ZEALAND-SAN FRANCISCO SUBSIDIZED STEAM SERVICES.

THE following are the shipments of produce for San Francisco, Rarotonga, and Tahiti from New Zealand since March last:—

	"Aorangi," 26th April.	"Tahiti," 24th May.	"Manuka," 21st June.	"Aorangi," 19th July.	"Tahiti," 16th Aug.
Gum, packages	15	7	24	4	..
Seeds, sacks	37	88	340	..	..
Grain, &c.	86	73	46	60	82
Meats, cases	71	140	153	161	190
Onions, cases and sacks	5	1	2	5	2
Potatoes, "	27	48	37	30	25
Timber, bundles	..	500	..	..	..
Sundries, packages	69	73	92	380	121
Butter, boxes	802	2	2	3	5
Apples, cases	100	6	..	4	..
Hemp, bales	..	..	..	..	129

THE BRITISH PRODUCE-MARKET.

HIGH COMMISSIONER'S CABLED REPORTS.

THE Department has received the following cablegrams from the High Commissioner for New Zealand. (NOTE.—Quotations, unless otherwise specified, are average market prices on spot.)

London, 17th August, 1912.

Mutton.—The market remains firm. A good demand continues. Canterbury 4⅜d. per lb.; North Island 4¼d. (lights), 3⅝d. (heavies). Ewes are selling freely at 3¾d. per lb.

Lamb.—The market is rather quiet. The weather lately has been very unfavourable to the sale of lamb. The position is quite satisfactory, however. Total supplies are 781,000 carcases short of last year's figures. Canterbury 5¾d. per lb., other than Canterbury 5⅝d.

Beef.—The market is quiet but steady. New Zealand hinds 3⅞d. per lb., fores 3½d.

Butter.—The market is quiet, small business doing. The demand is chiefly for choicest quality. Danish 129s. per cwt., Australian 112s., Siberian 107s.

Cheese.—The market is quiet but firm. New Zealand finest white and coloured are selling at 65s. to 66s. per cwt.

Hemp.—The market is firm. A good demand continues. A small supply of New Zealand. Transactions are light. Spot: New Zealand good-fair grade £26 15s. to £27 per ton, fair grade £25; fair current Manila £26 10s. to £27, for any positions. Stock 868 tons. The output from Manila for the week was 20,000 bales.

Wool.—The market is firm. 36's, low crossbreds, 1s. 1½d. per lb.; 40's 1s. 2d.; 44's, medium crossbreds, 1s. 2¾d.; 50's, halfbreds, 1s. 6¼d.; 56's, quarterbreds, 1s. 8¾d.; 60's, merinoes, 2s. 2d.

Wheat.—The market is quiet. New Zealand long-berried ex granary, per quarter of 496 lb., 42s.; short-berried, 40s.

Oats.—The market is quiet but steady. New Zealand short (Sparrowbills), per quarter of 384 lb., 24s.

Peas.—The market is dull, very little business doing. New Zealand peas (partridge), per 504 lb., 39s. (new crop).

Beans.—The market is very quiet. New Zealand beans f.a.q. (old crop), per 504 lb., 38s.

Cocksfoot-seed.—Market remains very flat.

London, 27th August, 1912.

Mutton.—There is a good demand for all qualities. Moderate supplies are coming forward. The market is firm at last quotations—viz., Canterbury 4⅜d. per lb., North Island 4¼d. (lights), 3⅞d. (heavies).

Lamb.—The market is slightly weaker, with less demand. The weather continues unfavourable. A small supply. Scotch lambs are marketed at an average price of 6d. per lb. Canterbury 5⅞d. per lb. (lights), 5⅛d. (heavies); other than Canterbury 5⅜d. (lights), 4⅞d. to 5d. (heavies). Heavy weights are difficult to sell.

Beef.—The market is quiet. A good demand for hinds. New Zealand hinds 3⅞d. to 4d. per lb., fores (slow) 3¼d.

Butter.—The market is quiet but steady. Danish 128s. per cwt., Australian 111s., Siberian 107s.

Cheese.—The market is steady, with a moderate demand. Prices are firm, at about quotations already given. New Zealand white and coloured 65s. to 66s. per cwt., Canadian white 64s. 6d., coloured 65s. 6d.

Hemp.—The market is firm, but little doing. Spot: New Zealand good-fair grade £27 5s. per ton, fair grade £26, fair current Manila £26 10s. Forward shipment: New Zealand good-fair £27 10s., fair £26 10s., fair current Manila £27. The output from Manila for the week was 34,000 bales.

Wool.—The market is firm, with more inquiry for crossbreds.

London, 31st August, 1912.

Mutton.—The market is firm, with more inquiry for forward delivery. Canterbury 4½d. per lb. (lights), 4¼d. (heavies); North Island 4⅜d. (lights), 4⅛d. (heavies). Ewes 4d. (small business doing, and prices weak in the market).

Lamb.—The demand is chiefly for medium weights. Canterbury 5¾d. per lb., other than Canterbury 5½d.; Plate 4¾d.

Beef.—The market is steady, but without animation. Quotations show a weaker tendency on account of the plentiful offerings of chilled. New Zealand hinds 3⅞d. per lb., fores 3⅛d.; Plate, chilled hinds 4d., fores 2¾d.

Butter.—The market is quiet; prices slightly weaker, except for best quality, which is scarce. Danish 128s. per cwt., Australian 110s., Siberian 106s.

Cheese.—The market is firm. The supply of New Zealand is practically exhausted. The average price for the week for finest New Zealand is 67s. per cwt.; Canadian 66s. to 67s.

Hemp.—The market remains firm. A good business has been done this week. Spot: New Zealand good-fair £27 10s. per ton, fair grade £25 10s. to £26, for any positions. Fair current Manila on spot £26. Forward shipment £26 15s. to £27 per ton. Tow: first grade £16 per ton, third grade £15. The output from Manila for the week was 27,000 bales.

Wool.—The market remains firm.

Kauri-gum.—The market is firm, with an improved demand at higher prices. Dark-brown selected rescraped 130s. to 160s. per cwt.; three-quarter scraped 85s. to 100s.; chips, drossy, 30s. to 45s.; rescraped pale amber £11 to £13; three-quarter pale scraped 150s. to 170s.; diggers' chips (good) 50s. to 60s. 525 cases offered, 300 cases sold. Stock 267 tons.

Wheat.—The market is quiet but steady. New Zealand long-berried wheat ex granary, per quarter of 496 lb., 41s.

Oats.—The market is steady, and fair business doing.

Peas.—The market is rather quiet; demand is getting better. New Zealand peas, partridge, per 504 lb., 40s. New crop.

Beans.—The market is dull; very little business doing. New Zealand beans f.a.q. (old crop), per 504 lb., 37s. Forward shipment 35s.

Cocksfoot-seed.—The market is unchanged.

London, 7th September, 1912.

Mutton.—Market remains firm, although high prices are restricting business. Supplies will be moderate, however; there is no prospect of a decline. Canterbury 4⅝d. per lb. (light weight), 4⅜d. (heavy weight); North Island 4½d. (light weight), 4¼d. (heavy weight); ewes 4⅛d.

Lamb.—The market is somewhat steadier. There is a better demand for heavy weights. Canterbury 5⅞d. per lb. (light weight), 5¼d. (heavy weight); other than Canterbury 5½d. per lb.

Beef.—The market is quiet; small business doing in frozen. Quotations are nominally unchanged—viz., New Zealand hinds 3¾d. per lb., fores 3⅛d.

Butter.—The market is quiet but steady. Danish 128s. per cwt., Australian 111s., Siberian 108s.

Cheese.—The market is firm, with an upward tendency. Canadian 67s. per cwt. (white), 67s. 6d. (coloured).

Hemp.—The market is not quite so firm. Buyers are holding back on account of the high prices. Spot: New Zealand good-fair grade £27 5s. per ton, fair grade £25 15s., fair current Manila £26 5s., October–December shipments, New Zealand good-fair £27 5s. per ton, fair grade £25 10s., fair current Manila £27 to £27 5s. The output from Manila for the week was 26,000 bales.

Wool.—The market is firm, with a hardening tendency for crossbreds. Current quotations for Bradford tops, 36's, low crossbreds 1s. 1¾d. per lb; 40's, low crossbreds, 1s. 2¼d.; 44's, medium crossbreds 1s. 3d.; 50's, halfbreds, 1s. 6½d.; 56's, quarterbreds, 1s. 9d.; 60's, merinoes, 2s. 2d.

Cocksfoot-seed.—There has been no alteration in the market since last week. Continental offered at 44s. 6d.; there are no buyers.

Mutton and Lamb.—River Plate shipments received during the month of August, 1912:—

	Mutton. Carcases.	Lamb. Carcases.
London	75,447	27,738
Liverpool	111,071	30,219
Hull	9,114	291
Newcastle	7,089	Nil
Southampton	19,928	9,762
Cardiff	300	Nil
	222,949	68,010
August, 1911	257,717	128,666